Marginal Landscapes? The Azraq Oasis and the cultural landscapes of the final Pleistocene southern Levant

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Submitted for
the degree of
Doctor of Philosophy

University College London

March 2009

I, Tobias Richter, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Abstract

This thesis examines the final Pleistocene cultural landscape of the Azraq Oasis in eastern Jordan on the basis of archaeological fieldwork conducted at Ayn Qasiyya and AWS 48, two Epipalaeolithic sites in the southern Azraq wetlands. It challenges traditional understandings of landscape and socio-cultural changes during the Epipalaeolithic period, and this period's role in shaping the subsequent emergence of agriculture and sedentism. The current model of socio-cultural change, which considers the Epipalaeolithic-Neolithic transition as a development from simple foragers, to complex collectors, to farmers, is critically reviewed. Evidence from the Epipalaeolithic of the Levant is highlighted that strongly suggests that this unilineal sequence must be re-evaluated. Furthermore, the social evolutionary underpinnings of this model are critiqued and rejected. This social evolutionary model is based on a conceptualization of the southern Levantine landscape as sub-divided into distinct phyto-geographical zones, which suggest a dichotomy between a lush 'core' and a impoverished 'periphery'. Palaeoenvironmental data, however, is argued to be poorly correlated with major instances of socio-cultural change. This dichotomy also relates to a static understanding of landscape as empty, commodified space.

To examine the Azraq Oasis from a different perspective and to suggest an alternative narrative the archaeological evidence produced by three seasons of fieldwork at Ayn Qasiyya and AWS 48 is first described in detail, and then interpreted from a practice orientated perspective. This practice perspective centres on examining the *châine opératoire* of the chipped stone artefacts and the activities and practices at the sites. It is argued that practices at these localities shapes space into social places, and that hereby landscapes become socially and culturally constructed. Using data from Ayn Qasiyya specifically, the social interactions of diverse social communities in the Azraq Basin can be tentatively reconstructed, providing a further example of the way in which social space was created though social engagement. I argue that these instances of the creation of places, and the evidence for social interaction, provide an alternative perspective on the Early and Middle Epipalaeolithic in the Azraq Basin and the southern Levant as a whole, which should lead us to reconsider the applicability of the geographical core-periphery dichotomy and social evolutionary models.

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Acknowledgements

I have been very fortunate to have received the help, support and encouragement of a large number of people over the course of this research, including friends, colleagues and family. This project would have been entirely impossible to carry out without their assistance, for which I will always be indebted to them.

I am most grateful to my principal supervisor Andrew Garrard for his support and encouragement, and sharing his unique insight into the archaeology of the Azraq Basin with me. I am also very grateful to Louise Martin and Andrew Garrard, as my second and third supervisors, for their help and advice. Together all three were a PhD students' supervisory 'dream team'. I am also grateful for comments from my two examiners Douglas Baird and Chantal Conneller.

I would have never thought of taking on an entire fieldwork project as basis for my PhD, if it was not for Leslie Quintero, Philip Wilke and Gary Rollefson, who directed the Azraq Wetlands Survey and first identified Ayn Qasiyya as an Epipalaeolithic site. Over the years Leslie, Philip Wilke and Gary Rollefson have been an invaluable source of encouragement and support and I cannot thank them often enough for the trust they have invested in me. I was very fortunate to see both Leslie and Phil on a research trip to UC Riverside in March 2008 and am grateful for their help and hospitality while visiting the Lithic Technology Laboratory. Gary has always been immensely helpful, especially when our times in Jordan overlapped. It's always been a pleasure to sit down with him and talk archaeology over a drink. I sincerely hope that this work does justice to their belief in me.

I cannot say thanks often enough to Lisa Maher, who not only selflessly agreed to read and comment on the complete first draft of this thesis, but who has offered her advice, help and support numerous times over the last couple of years. Lisa participated in the 2006 field seasons and her advice was critical to set-up the project during a critical phase. I consider myself fortunate to count her among one of my friends and to continue collaborating with her on the Epipalaeolithic Foragers in Azraq Project, of which the Azraq Oasis work has since become a part.

I am very grateful to Matthew Jones from the Department of Geography at Nottingham University for his outstanding work on the palaeoenvironmental analysis of the Ayn Qasiyya sediments, his company and advice in the field, and his friendship.

I have also been fortunate to have met and worked with Jay Stock, and am extremely grateful for his help and advice in excavating and analyzing the human remains from Ayn Qasiyya. Evenings in Azraq would have been so much duller without his seemingly endless digital movie archive.

Brian Boyd has been a long-term source of knowledge, wisdom and friendship, for whose support I will always be indebted to. In addition, I thank Steven Matthews, Claire Cohen, Gabriel Moshenska, Jane Humphries, Roseleen Bains, Louise Iles, Andrew Shapland, and the graduate research student community at the IoA as a whole for their friendship, moral support, coffee breaks and nights out.

Fieldwork in Azraq would have equally been a whole lot harder without the help of a series of amazing field archaeologists and friends who worked very, very hard without any material compensation, apart from the occasional cold beer. I am very grateful to: Daniel Jones, Constanze Röhl, Jamie Frazer, Andreas Schaub, Tanja Kohlberger-Schaub, Pat Critchley, Kevan Edinborough, and William Mills. I would also like to thank Jennifer Jones, Samantha Allcock, Rowena Henderson, Eva-Maria Pinheiro, Luisa Haegele, Samuel Bosanquet, Berber Wouda, Lucy Wills, Rebecca Whiting, Alice Stacey, Cara Tremain, Rebecca Kelly, Sarah Luddy, Jill Goulder and Raminder Kaur who participated as student archaeologists on the excavations. In the UK, I am grateful to Brittany Thorne for working on the faunal assemblage as part of her undergraduate dissertation. Special thanks are also due to Caroline Hebrons who kindly prepared the Ayn Qasiyya burial reconstruction drawing.

In Jordan, I am grateful for the co-operation and support from a number of individuals and organizations. I am particularly grateful to the Department of Antiquities of Jordan and its director Dr. Fawwaz al-Khrayshah for giving permission to carry out this work. I would also like to thank Ahmed Lash and Aref al-Datham from the Azraq Antiquities office for their help. I also thank the Royal Society for the Conservation of Nature for giving permission to work in the Azraq Wetlands Reserve, and am particularly grateful to the reserve staff for all their amazing and beyond-the-call-of-duty help, especially Sami Tarabieh, Anwar el-Halal and Hussein Tarabieh.

At the Council for British Research in the Levant I am as always extremely grateful to Bill Finlayson, whose support and help was absolutely critical to the success of the project. I am also grateful to Nadja Qaisi for her invaluable help in all administrative matters. I am also grateful to all my friends in Jordan who have made my stay there such a pleasant experience, especially Charlotte Whiting, Matthew Brewer, Sandra Rosendahl, and Jaimie Lovell.

The Institute of Archaeology at UCL has been a welcome institution to conduct this research and I am grateful to Andrew Bevan for advice on GIS questions, Stuart Laidlaw for help with photographs and images, Norah Moloney for answering lithics questions, Arlene Rosen, and Karen Wright. I am also grateful to Judy Medrington, Thom Rynsaard, Barbara Brown, Fiona McLean, and Sandra Bond for their help in dealing with various and multiple administrative matters.

I am also grateful to Anna Belfer-Cohen, Nigel Goring-Morris and Erella Hovers for welcoming me (once again) at the Department of Prehistory at the Institute of Archaeology at Hebrew University, and for allowing me to consult their lithic reference collection. In addition to these colleagues, my work has benefited from discussions with Naama Goren-Inbar, Leore Grosman, Ofer Marder, Maysoon al-Nahar, and Dani Nadel. Special thanks go to Steve Rosen for vital advice on lithics and statistics.

The research for this thesis has received financial support from the Arts and Humanities Research Council via a Doctoral Award and through the Epipalaeolithic Foragers in Azraq Project, the Institute of Archaeology Awards, the University College London Graduate School, the University of London Central Research Fund, and the Palestine Exploration Fund. In addition, institutional support was provided by the Council for British Research in the Levant. I would like to express my gratitude to all these organizations for supporting this work.

Above all, I am indebted to those special people in my life whose support and encouragement it would have been impossible to finish this work. I would like to thank Anna for her love and care, my parents Antje and Christian for their unwavering belief in me, and my brother Thomas.

Chapter 1: Introduction

The transition from hunting and gathering to agriculture is one of the most enduring themes of interest to archaeologists working in the prehistory of Southwest Asia. Research into this transformation has intensified dramatically following the earliest investigations of this topic during the early 20th century. Ever since Braidwood's (Braidwood 1960; Braidwood 1971; Braidwood & Howe 1960) innovative work in the "Hilly Flanks" of the Taurus and Zagros, archaeologists have increasingly focused on the importance of the economic and climatic factors that caused the switch from foraging to agriculture. Environmental change continues to be seen by many as the driving factor underlying what has been described as an economic, social and cultural revolution away from a mobile lifestyle based on hunting and gathering to village life, agriculture and domesticated resources (Bar-Yosef 1995, 1996; Bar-Yosef & Belfer-Cohen 1989, 1991, 1992; Bar-Yosef & Belfer-Cohen 2000; Bar-Yosef & Meadow 1995; Goring-Morris & Belfer-Cohen 1998; Henry 1989, 1995; Weisdorf 2005). The Neolithic Revolution, first coined by Gordon Childe more than 80 years ago (1936), remains a powerful metaphor to characterize this transition. With the advent of the New Archaeology and processual approaches to understand the past, archaeologists came to characterize this shift within a more gradual, evolutionary process describing it as a sequence from foraging, to intensive cereal collecting, and the gradual development of cultivation and domesticated plant resources. In addition, a number of scholars put forward social factors and explanations for the adoption of agriculture and village life. Jacques Cauvin's (1978) early work in Upper Mesopotamia, and his later synthesis (Cauvin 1994, 2000) placed the onus for these changes on the advent of religious consciousness amongst Pre-Pottery Neolithic communities, and a conceptual, psychological change in how they related to plants, animals, the landscape, and each other, through the lens of their cosmological understanding. Much adapted and modified from its original structuralist position, this latter view has been increasingly highlighted as a crucial driving force behind the economic changes of this transition (Bender 1978; Hayden 1990, 2003; Verhoeven 2004; Watkins 1990; Watkins 2004a; Watkins 2004b, 2005b). Hodder (1990) emphasizes that changes in social attitudes must take precedence over economic and environmental factors in explaining the origins of agriculture, since neither can be considered as determining human practices alone. Nevertheless, economic and environmental causes remain the most common explanations in discussions of the emergence of agriculture.

In these debates, the Epipalaeolithic (ca. 21,000 – 10,500 cal B.C.) has played a central role, partly due to its recognized unique character. The Epipalaeolithic is an archaeological phenomenon unique to Southwest Asia. Although Garrod (1932) described the Natufian, a Late Epipalaeolithic culture, as a Mesolithic industry, due to the abundance of geometric microliths, she also recognized that on the basis of the fauna recovered from the Mt. Carmel caves, it dated to the last Ice Age. The presence of ground stone tools, portable art objects, architecture, shell and bone bead pendants, as well as a diverse human burial record, highlighted the importance of the Natufian and its role in the onset of agriculture from early on (Boyd 1999). The earlier phases of the Epipalaeolithic have, by comparison, often received far less attention. But the Epipalaeolithic appeared to fit neatly into an evolutionary scheme in which simple hunter-gatherers or foragers developed into complex collectors, whose critical economic decisions were forced by climatic changes that led them onto the irreversible course to agriculture (Bar-Yosef 1998; Bar-Yosef 2004; Bar-Yosef & Belfer-Cohen 1989, 1991, 1992; Bar-Yosef & Belfer-Cohen 2000; Bar-Yosef & Meadow 1995; Braidwood 1960; Braidwood 1971; Flannery 1969, 1972, 1973, 2002; Henry 1989, 1995). This general framework was first discussed by L. Binford (1968; 1980; 1983), and directly applied to Southwest Asia by K. Flannery (1969; 1972; 1973; 2002). Little of this overall scheme of early and middle Epipalaeolithic mobile hunter-gatherers and Natufian sedentary, complex hunter-gatherers has changed to-date (Bar-Yosef 2004; Verhoeven 2004; Weisdorf 2005). While many have explored more interpretative and contextual approaches toward the early Neolithic in particular, the Epipalaeolithic appears neglected and left behind. This is undoubtedly partially true due to the perceived richness of the archaeological evidence during the Neolithic, with its preservation of plastered skulls, special buildings or shrines, idols and figurines, and other decorative art items. The sheer variability on a common theme evident in this corpus of artistic expression has naturally invited wide-ranging interpretations and discussions. In contrast, the early and middle Epipalaeolithic was commonly considered from more traditional archaeological perspectives, placing an emphasis on economic aspects, site formation processes, lithic technology and settlement patterns. Such a perspective fits well into approaches seeking to develop long term models of cultural change and evolutionary process, since it is commonly suggested that functional, technological or economic aspects are more readily available for archaeologists to study than the mental, psychological or symbolic aspects of past societies (Clark 1993; Hawkes 1954; Hodder 1982b, 1986; Lindly & Clark 1990; Robb 1998; Shanks & Tilley 1987b; Shennan 2002). Only more recently have Palaeolithic archaeologists become more directly concerned with interpretative approaches (e.g. Baird et al. 1995; Boyd 2002; Bradley 2000; Cobb 2005; Conneller 2001; Conneller 2004; Conneller & Warren 2006 and papers therein;

Dobres 2000; Gamble 1999, 2004, 2007; Gamble & Gittins 2004; Gamble & Porr 2005; Geneste et al. 2008; Lewis-Williams 2002; Sassaman 2000; Sinclair 2000; Warren 2006; Warren 2001; Wobst 2000).

This study focuses on the early and middle Epipalaeolithic of the Azraq Oasis, situated in the semi-arid to arid steppe and desert zones of eastern Jordan. Using two sites in the oasis (Ayn Qasiyya and AWS 48) as a case study, this thesis explores the current state of research into the Epipalaeolithic. In particular, it assesses the validity of an overarching social evolutionary meta-narrative that underlies much of the discussion of the socio cultural transformations of the Epipalaeolithic-Neolithic transition. The transition from simple to complex hunting and gathering and then to farming is a sequence clearly couched in social evolutionary terms (Ingold 1992, 1996, 2000; Pluciennik 2002a, b, 2005; Thomas 2004), suggesting a progressive development on a scale of increasing cultural complexity. Although this scheme has been persuasive for quite some time, emerging archaeological evidence, as well as theoretical debates cast some doubt on the applicability of this model. Various field projects and archaeological studies have begun to challenge the status of the early Epipalaeolithic as a simple hunting and gathering economy. Ethnographic studies of recent hunting and gathering groups, which have often served as ethnographic analogies to explain the archaeological patterns in Southwest Asia, have also begun to show the incredible diversity of human social organization through time. This diversity is not easily pressed into social evolutionary or social-typological schemes and a wide range of studies have shown that people's understanding of the world and cosmology have a direct bearing on the economic decisions they make (Bird-David 1990, 1992a, b; Ingold 1996, 1998, 2000).

In the Levant this social evolutionary meta-narrative is also closely related to a geographical dichotomy. Because change in this narrative is driven by climatic and environmental alterations, archaeologists have paid close attention to palaeoenvironmental conditions. These are commonly reconstructed as part of a tripartite sub division of the Levant into phyto-geographical zones: the Mediterranean woodland zone, the semi arid steppe and the arid deserts (Henry 1989; van Zeist & Bottema 1982; Zohary 1973; Zohary 1980). Climatic changes, it has been argued, triggered changes in the size of these zones which in turn caused contractions and expansions of human populations and necessitated new technological and cultural adaptations (Bar-Yosef 1995; Bar-Yosef 1998; Bar-Yosef 2004; Bar-Yosef & Belfer-Cohen 1991; Henry 1989, 1995, 1998). Current interpretations have placed a heavy emphasis on the environmental affordances of these different regions, which has led to a geographical dichotomy between marginal areas and a core region centring on the Mediterranean woodland zone. This distinction does not only reflect differences in the ecological configuration of these areas, but is often assumed to represent a cultural dichotomy as well, between areas considered to be more crucial to the overall articulation of cultural change in the region, and areas less important in the same process. This study suggests that a social perspective on late Pleistocene cultural landscapes in the southern Levant is required, because it provides crucial, complementary points for archaeologists to consider when trying to understand how humans operated in past environments and in relation to them. This underlying mechanism is a key aspect of the social evolutionary narrative. By distinguishing between an environmental amenable ‘core’, the Mediterranean woodland zone, in which multiple adaptive opportunities presented themselves to human groups and a semi-arid to arid periphery the steppes and deserts, a hierarchical division is presented between different regions of the Levant. Being more arid, steppic and deserts zones are thought to have led to distinct, specialized adaptations, which proved to be evolutionary dead ends (Goring-Morris 1995; Goring-Morris 1987).Those groups residing in the Mediterranean zone, where wild cereal stands were abundant, on the other hand developed novel subsistence means and adaptations that led directly to cultivation and later to domestication. However, the data and processes underlying this model can also be critiqued. The palaeoenvironmental record covering the Epipalaeolithic to Neolithic transition is patchy, not always credibly dated or correlated across multiple datasets, and not always matching the archaeological record. More importantly, it discounts the role of local environmental variation and conditions by relying instead on a macro-scale account of palaeoenvironmental change.

This perspective also displays a functionalist understanding of the way in which people relate to the environment. Landscapes are treated as inert, physical backdrops to human action, providing obstacles or opportunities according to environmental and climatic conditions (Barrett 1999; Cosgrove 1984; Ingold 1993; Layton & Ucko 1999; McFadyen 2006; Thomas 1993, 2001). This view does not account for the agencies of individuals, their choices and actions taken within the context of the social and environmental conditions, which is now understood to be contextual and inherently social in nature. Given these insights, this work seeks to investigate how we could operationalize a more nuanced view of the Epipalaeolithic based on what can be broadly termed practice or agency theory using Ayn Qasiyya and AWS 48 case studies. It thereby focuses on an early/middle Epipalaeolithic site situated within the purported arid periphery of the Southern Levant to stimulate a different understanding of these kinds of sites, the patterns and processes that create them, and what such an understanding suggests for the current social evolutionary narratives. I focus on the early and middle Epipalaeolithic since the naturalistic image of hunter-gatherers is particularly prevalent in these periods (Henry 1989, 1995). In contrast to the well studied late Epipalaeolithic, when groups begin to construct some of the first buildings, early and middle Epipalaeolithic communities are seen to have had little impact on their respective environments and landscapes and are mainly reduced merely to reacting to external climatic circumstances. Excavation, survey and artefact studies are used to provide and assess the archaeological evidence to develop an understanding of the Epipalaeolithic based on the concept of agency. In particular, themes developed under the regime of landscape archaeology will be picked up and situated within the context of trying to understand hunter gatherer landscapes specifically. One of the primary datasets of the Epipalaeolithic is constituted of chipped stone, which are examined using the heuristic and theoretical concept of the *chaîne opératoire* to align their analysis with the concept of practice and agency. It is argued that the technological aspects of lithic manufacture are of a fundamentally social character and thus provide insight into social patterns and processes in the Epipalaeolithic communities of the Azraq Basin.

I outline and examine the social evolutionary mega narrative in detail in chapter 2. Here, I highlight recent archaeological evidence that contrasts strongly with the idea that there was a transition from simple to complex hunter-gatherers which led to emergence of village life and agriculture at the Epipalaeolithic to Neolithic transition. In relation to this model I also discuss in detail the geographical core-periphery dichotomy within which this social evolutionary model is situated. I then outline the patchy palaeoenvironmental datasets and their often poor correlation to the archaeological record, before discussing the theoretical issues that should lead us to rethink the social evolutionary interpretation of this transition critically. Finally, in chapter 2 I suggest that agency and practice theory approaches are well-suited to consider a contextual approach to the Epipalaeolithic of Southwest Asia. I outline the background and development of agency theory in archaeology in chapter 3, paying particular attention to the relationship between landscapes and agency. I discuss the importance of landscape archaeology and the diversity of approaches within this field, before turning my attention to the role of phenomenological approaches. This discussion raises concerns with the methodological rigor of many phenomenological approaches in archaeology, and I argue instead that closer attention has to be paid to the interdependent relationship between agency and structure, rather than focusing on individual experience singularly. Chapter 4 seeks to situate this theoretical background more directly within a heuristic and empirical framework. Specifically, I outline how concepts of practice and agency can be used to study hunter-gatherer landscapes. I nevertheless emphasize the importance of site formation processes to develop an understanding of hunter-gatherer sites in their landscapes and discuss briefly the background to such approaches in archaeology and how they will be utilized as part of this study. I then turn my attention to the concept of the *chaîne opéra-*

toire and how it will be used here to study and interpret the lithic technology and artefacts, and how this heuristic device connects to the wider concepts of agency and structure. Chapter 5 introduces the study area and outlines the archaeological sequence in the Azraq Basin, by discussing the major excavated Epipalaeolithic sites. Sources of palaeoenvironmental evidence will also be described. In chapter 6, I describe in detail the results of the excavations at Ayn Qasiyya. This chapter presents a summary of the excavated areas and their stratigraphy, geomorphological and sedimentological data, faunal and human remains. The second part of this chapter consists of a detailed discussion of the site's formation processes, using both sedimentological data and the lithic assemblages from each of the three early Epipalaeolithic excavation areas. I argue that while the archaeological sediments at Ayn Qasiyya have been affected by post-depositional processes, they remain substantially intact to enable a detailed discussion of the recovered archaeological remains with respect to the theoretical framework outlined before. The archaeology of the second study site, middle Epipalaeolithic AWS 48, will be presented in chapter 7. The survey, surface collections and excavations at the site will be outlined, paying particular attention to the spatial distribution of artefacts in the general area of the site, with detailed attention to cluster 3, which was selected as a representative sample. This analysis shows that artefact distributions in the area, while clustered into distinct high density areas, are characterized by an internally-random distribution. These results, combined with data from the lithic analysis, suggests that although the lithic assemblages from AWS 48 have been heavily subjected to post-depositional surface modifications and have been somewhat disturbed, the overall proportionality of the assemblage indicates that they also represent true palimpsests of past human activity at the site. The Ayn Qasiyya lithic assemblages and their *châine opératoire* are discussed in detail in chapter 8. I describe the raw materials used, the initial core reduction, blank production, and microlith manufacturing techniques and typological aspects, before summarizing the *châine opératoire* and drawing out differences and similarities between the three excavation areas. Chapter 9 represents the same undertaking for AWS 48, focusing in particular on cluster 3. In chapter 10, I draw together the various results from the fieldwork in the Azraq Oasis and contextualize them with the theoretical aspects outlined in chapter 3 and 4. I argue that the different patterns of lithic manufacture, found especially at Ayn Qasiyya, allow us to trace the social interaction of different Epipalaeolithic communities in the Azraq Basin. Arguing that the different techniques represented in the lithics hint at diverse histories of learning shared between members of *communities of practice*, it is possible to discuss their social engagements and encounters. Using additional evidence from the archaeological record I discuss how these interactions resulted in the shaping of space by creating places within the landscape that referenced past activities and practices. I argue that this evidence for interaction betrays the idea that this region can be understood as a marginal zone. Instead, the Azraq Basin emerges as a zone of diverse interaction and engagement between the members of different Epipalaeolithic communities, making this region central to their social experience. I also discuss the palaeoenvironmental evidence, which shows locally amenable conditions that permitted intense human settlement and provided the possibility for this interaction. This evidence contradicts overarching palaeoenvironmental models that consider the eastern Levant as a fringe or peripheral zone in which hyper-aridity prevailed during the Last Glacial Maximum. Instead, multiple lines of evidence indicate that wet and marshland conditions existed at numerous localities throughout the basin, indicating considerable local variation not recognized in macro scale climatic models.

Chapter 2: Landscape and Evolution in the Epipalaeolithic Southern Levant

INTRODUCTION

Interpretative approaches to the archaeology of landscape have been an important aspect of archaeological practice in the past decade or so and have vastly expanded our understanding of past cultural landscapes. By focusing on the way in which communities were actively engaged in the construction and making of past landscapes a significant element in our understanding of the past has been highlighted and has shifted archaeologists' focus beyond the confines of individual sites. Landscape archaeology can be seen as a holistic endeavour drawing on environmental, geoarchaeological, topographic, architectural and material culture studies, and using a wide variety of survey and excavation data (Aston 1985; Aston & Rowley 1974; Brück 2005; papers in David & Thomas 2008a; Fleming 2006; Johnson 2006a; Thomas 2001, 2008). New powerful tools, such as Geographical Information System (GIS) software, have enhanced the analytical element of landscape studies. But, this field has also proved attractive to archaeologists because it approached the study of landscapes from a different epistemological perspective (Barrett 1994, 1999; Chadwick 2004a; Chadwick 2004b; Cosgrove 1984; Gosden & Head 1994; Hirsch & O'Hanlon 1995; Ingold 1993, 2000; Layton & Ucko 1999; Thomas 1993, 2001, 2008). This more reflexive hermeneutic has aimed to move away from totalizing, generalised understandings of landscape. Instead a more contextual appreciation of the manifold ways in which the physical elements of spaces were perceived, meaningfully constituted and socially constructed has emerged. Although the vast majority of such social perspectives on landscape have been undertaken as part of investigations into later prehistoric monumental landscapes in Britain (Brück 2005), others have recently begun to consider how earlier prehistoric communities were also engaged in making their landscapes (Boyd 2004; papers in Cobb 2005; Conneller 2000, 2001, 2005; Gamble 1999; Gamble & Porr 2005; McFadyen 2006; Warren 2001). Such perspectives have been influenced by wider changes in the social sciences since the linguistic turn, which has challenged the materialist image anthropologists and archaeologists have long held of hunter-gatherers as passive subjects merely reacting to changes in the external environment. These conceptualisations of landscape provide a very different and, I would argue, fruitfully complementary viewpoint on hunter-gatherer societies that can aid us significantly in understanding the composition and character of the material remains of the past. Such an understanding of past hunter-gatherer communities depends on accepting that humans operated as knowledgeable social agents within their social and physical worlds, simultaneously constrained and enabled by social structures, recreating and reconfiguring them in a process of interaction and mutual engagement.

The Epipalaeolithic period of the southern Levant[1] is characterised by the presence of various groups pursuing a gathering and hunting lifestyle who have been the focus of attention, because they directly preceded the emergence of agriculture and sedentism (Bar-Yosef 1998; Bar-Yosef 2004; Bar-Yosef & Belfer-Cohen 1989, 1991, 1992; Bar-Yosef & Belfer-Cohen 2000; Bar-Yosef & Meadow 1995; Goring-Morris & Belfer-Cohen 1998; Goring-Morris et al. 2009; Henry 1989, 1995). Several regional studies have produced a wealth of insights detailing the climatic history of the region in correspondence with socio-cultural and economic changes visible in the archaeological remains. The majority of these studies have taken the view that environmental circumstances, induced by global climatic change, dictated the conditions under which changes in human subsistence practices and settlement patterns occurred. The relationship between past environments and how humans acted in them is seen as crucial to understanding the variable and creative means by which people coped with the difficulties, risks and vagaries that physical conditions placed on them. Yet, one of the contentions here is that the onus for socio-cultural change in the Epipalaeolithic of the Levant has been too straightforwardly placed on climatic change. Landscapes are primarily understood as inert spaces and physical entities composed of variable kinds of resources to be exploited by people. There is little appreciation for the ways in which people meaningfully construct, perceive and make landscapes as part of their daily, habitual engagement with them. This latter aspect is, however, crucial in trying to disentangle people's relationship with the environment and how societies were shaped as part of constant and interdependent processes of negotiation between landscapes and people. This perspective, which I will outline in more detail in the second chapter, accepts the knowledgeability of human agents and the processes of structuration as a central premise to understand this relationship (Baird et al. 1995; Barrett 2000; Barrett 2001; Barrett & Fewster 1999; Bourdieu 1977, 1990; Dobres & Robb 2000; Dornan 2002; Gardner 2004, 2007; Gibson 1979; Giddens 1979, 1984). By focussing on landscape, it is hoped that a holistic perspective can be achieved; one that takes into account variable and diverse lines of evidence to understand how early and middle Epipalaeolithic communities in the southern Levant engaged in actively making cultural landscapes.

1: Levant refers here to the countries of Lebanon, Syria, Jordan, Israel, and the Occupied Palestinian Territories. I will use this term to describe this geographical region, since it is less politically loaded and more neutral then Middle or Near East. Such terms impose a geographical perspective that assumes western Europe as a centre.

THE EPIPALAEOLITHIC SEQUENCE IN THE LEVANT: CURRENT INTERPRETATIONS

Definitions of the Epipalaeolithic period have varied over time reflecting ongoing debates about the nature of the archaeological evidence from the region (Figure 2.1, 2.2, 2.3 & 2.4). René Neuville first applied the term Epipalaeolithic to the excavated materials from his Judean cave sites (1934; 1951). Given that prehistoric archaeology was primarily finds-orientated at the time, he included all lithic assemblages containing microliths in this definition. Perrot (1955; 1960) however suggested later that the use of the term Epipalaeolithic should be reserved solely for the previously defined 'Natufian culture' (Garrod 1932), arguing that it reflected the first true departure from an Upper Palaeolithic way of life. In his seminal work on the Late Pleistocene period in the Levant, Bar Yosef (Bar-Yosef 1970) followed Neuville's definition and included both Kebaran and Geometric Kebaran assemblages under the term Epipalaeolithic. For Bar-Yosef, the abundance of microliths in post-Last Glacial Maximum (LGM) assemblages justified that this phase should be seen as distinct from the late Upper Palaeolithic. This identification of the Epipalaeolithic with microliths was later challenged by Gilead (1984; 1988), who argued that assemblages with a high microlithic component existed prior to the early and middle Epipalaeolithic. Therefore, these terms should be subsumed by the Upper Palaeolithic and the term Epipalaeolithic should not be used for pre-Natufian assemblages (Gilead 1991). He suggested that the term Epipalaeolithic should be based on differences identified in subsistence practices alone, visible only with the onset of the Natufian, as argued by Perrot. Regardless of Gilead's objection most scholars continued to consider Epipalaeolithic as applying to the entire final Pleistocene sequence from the Last Glacial Maximum to the beginning of the Holocene (Bar-Yosef 1981, 1989; Bar-Yosef & Vogel 1987; Byrd 1998; Byrd 1994b; Goring-Morris 1995; Goring-Morris & Belfer-Cohen 1998; Goring-Morris 1987; Henry 1989, 1995). These authors argue that the speed of change in stylistic attributes and the diversity in Kebaran, Geometric Kebaran, Natufian, and other assemblages displays a clear discontinuity from preceding periods and justify a distinct label (Belfer-Cohen & Goring-Morris 2003). Yet, some ambiguity remains with respect to defining the transition from the Upper Palaeolithic to the Early Epipalaeolithic. Goring-Morris (1995) has recently defined the Masraqian as a transitional industry to include both elements of the late Ahmarian and the early Epipalaeolithic. Recent excavations at the transitional Upper Palaeolithic/ Early Epipalaeolithic site of Ohalo II that have revealed the remains of small brush huts, abundant wild cereal grasses, evidence for fishing and extended periods of site occupation, have reinforced the impression that the label Epipalaeolithic does mark somewhat of a departure from the Upper Palaeolithic (Nadel

2002). Throughout this thesis I retain the use of the term Epipalaeolithic as a chronologically-defined label, which has its starting point during the latter part of the Last Glacial Maximum (22,000 cal B.P.)[2] ending with the onset of the Holocene interglacial at about 11,500 cal B.P. and the appearance of Pre Pottery Neolithic A (PPNA) lithic assemblages.

Global climatic changes in the period between the Last Glacial Maximum and the beginning of the Holocene, detected in ice cores, marine sediment sequences and terrestrial palynological cores, had a significant impact on the Levantine landscape (Figure 2.4). Prior to the Last Glacial Maximum temperatures began to decrease in the northern hemisphere, which was marked by the lowering of lake levels in the Levant and the onset of cooler temperatures (Bar-Matthews et al. 2003; Bartov 2003; Bartov et al. 2002; Cordova 2007; Macumber 2001; Robinson 2006; Rosen 2007). Starting from about 23,000 years cal B.P., cool and arid conditions of the Last Glacial Maximum prevailed in the Levant, lasting until about 19,000 years cal B.P. In how far these conditions were a pan-Levantine phenomenon, cannot be entirely verified at present, but effects on local conditions may have been variable (Garrard 1998). The levels of Lake Lisan, predecessor of the Dead Sea, remained high during this period. After 19,000 years cal B.P. climatic conditions in the region were characterised by gradual amelioration, although the Heinrich event 1 at around 16,000 cal B.P. appears to have once again marked an episode of cooling, with falling lake levels. True climatic amelioration began at around 15,000 cal B.P. with the onset of the Bølling-Allerød warm interval, which lasted until about 13,000 cal B.P. High lake levels persisted during this time. Oak forests appear to have covered much of the western portion of the Levant and precipitation in the Mediterranean zone appears to have been at about the same level as today. The Younger Dryas, dated to between 12,700 – 11,500 cal B.P., marks the rapid onset of what appears to have been an extremely arid episode, during which lake levels dropped and salts were deposited in Lake Lisan (Robinson 2006). Temperatures also appear to have dropped markedly during this interval. This general climatic outline of the final Pleistocene sequence in the Levant is currently used as the primary means to model socio-cultural changes in the region during the Epipalaeolithic (Bar-Yosef 1987b, 1989; Bar-Yosef 1995, 1996; Bar-Yosef & Belfer-Cohen 1989, 1991, 1992; Bar-Yosef & Belfer-Cohen 2000; Fellner 1995a; Goring-Morris & Belfer-Cohen 1998; Henry 1989, 1995, 1998). It serves as the primary causal factor in explanations of how cultural change came about by considering the effects climatic changes had on technology, subsistence economy, settlement pattern and social organization, and how far these enabled humans to survive adverse climatic conditions or take advantage of favourable environmental situations.

2: Throughout I use calibrated radiocarbon years before present, which have been calibrated using Calib 5.1.0 and the INTCal04 calibration curve

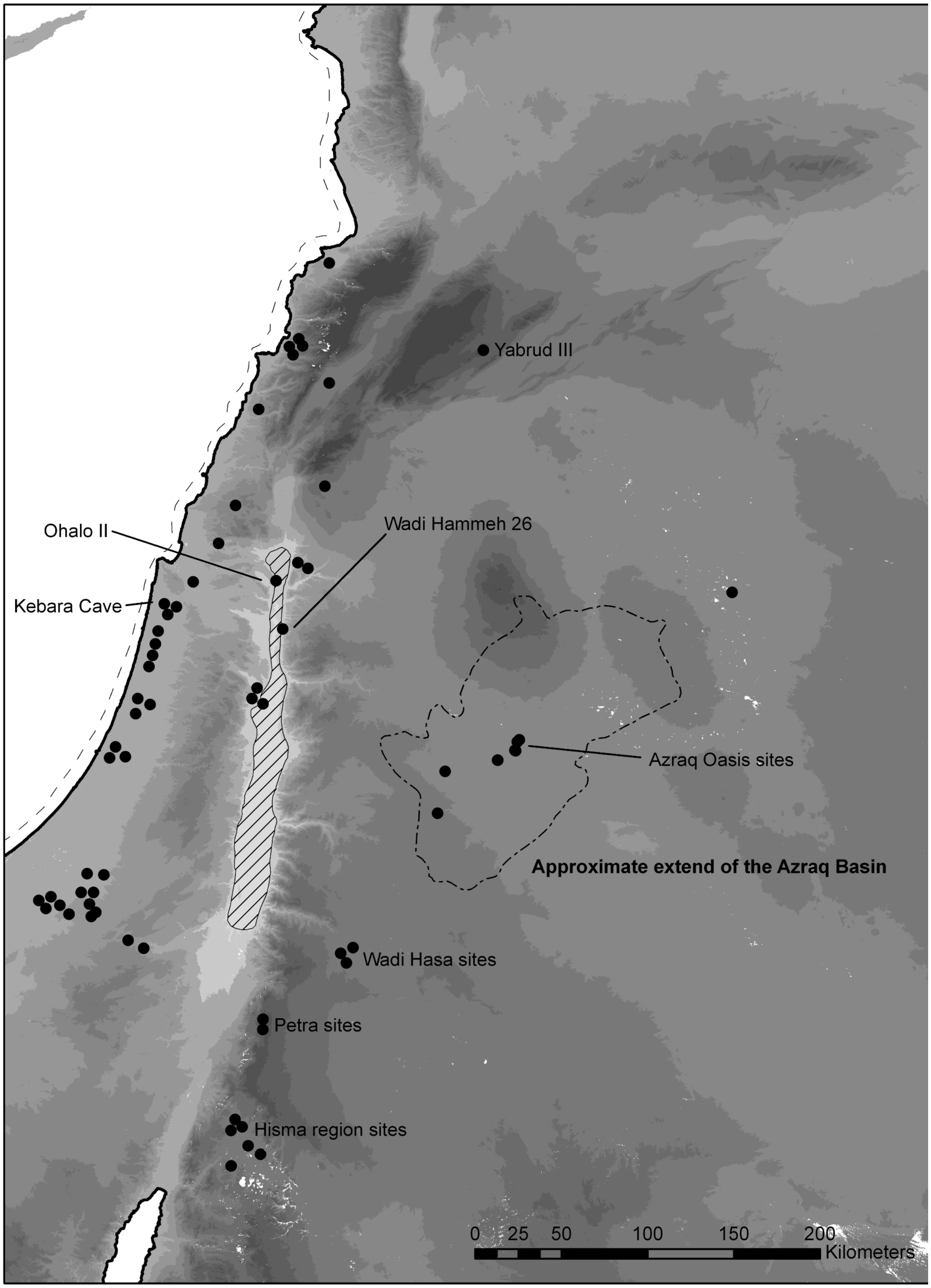


Figure 2.1: Distribution of major Early Epipalaeolithic sites in the southern Levant, indicating the approximate extent of the Lisan lake and the late Pleistocene shoreline.

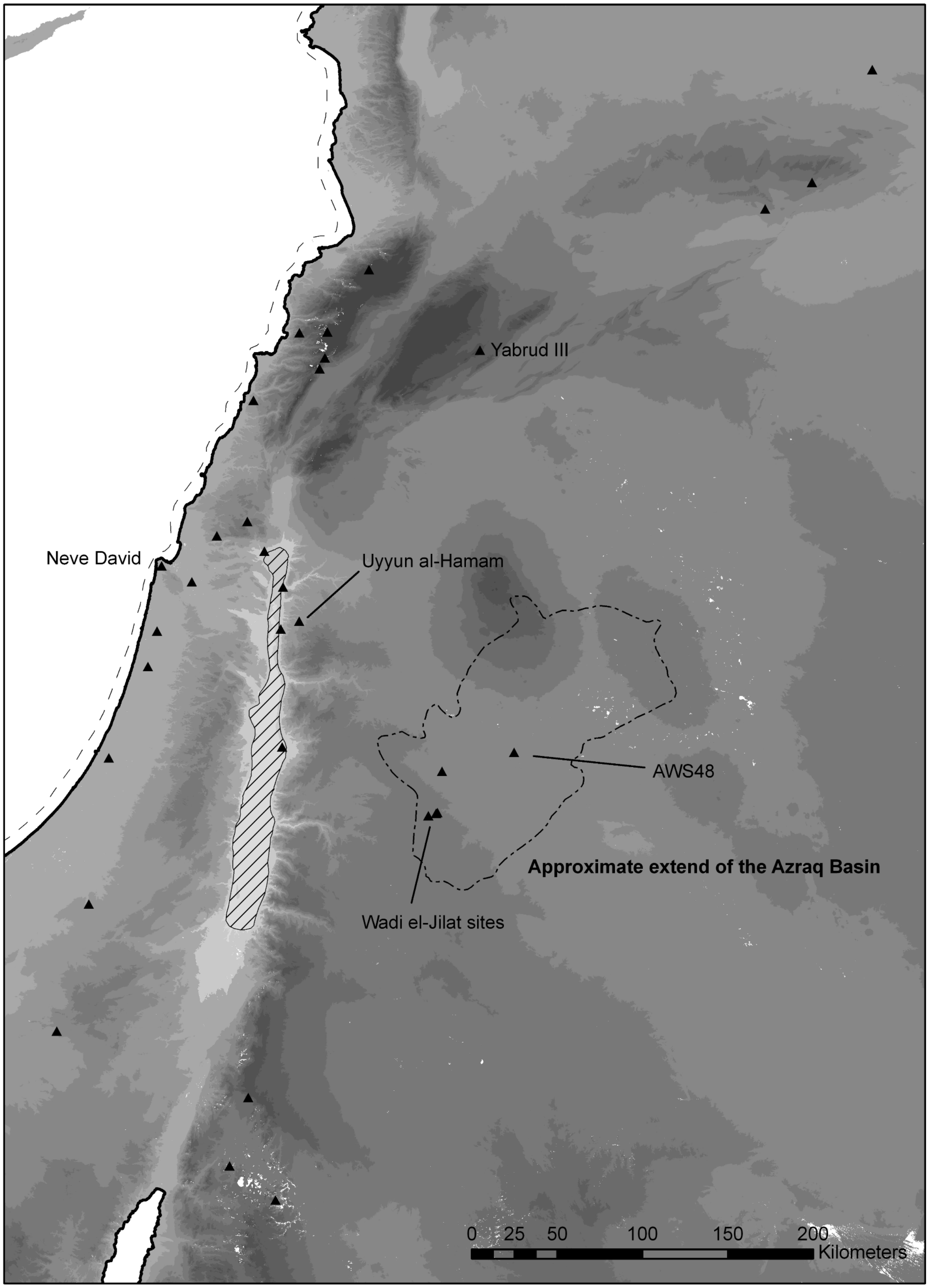


Figure 2.2: Distribution of major Middle Epipalaeolithic sites in the southern Levant, indicating the approximate extent of the Lisan lake and the late Pleistocene shoreline.

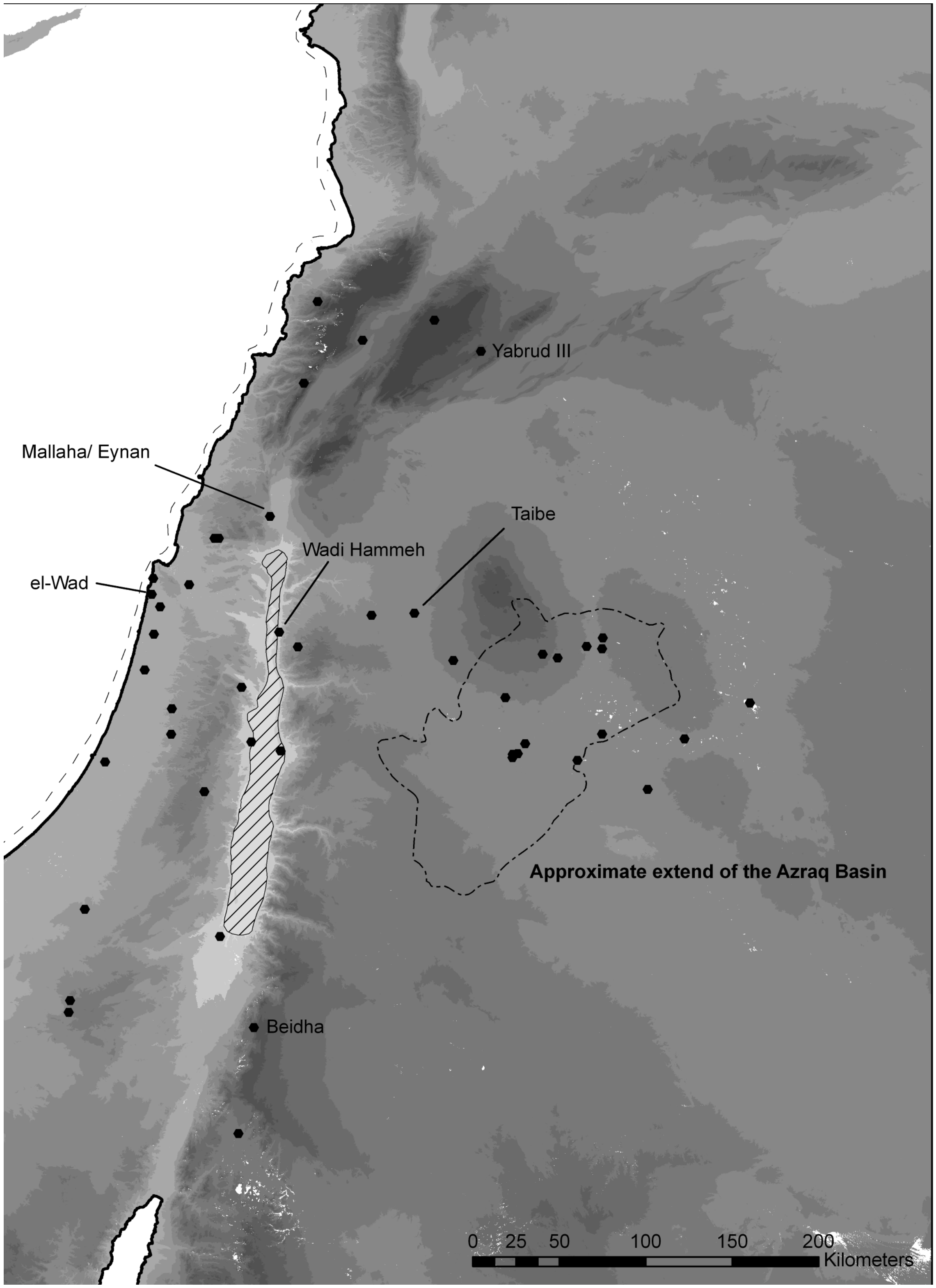


Figure 2.3: Distribution of major Late Epipalaeolithic sites in the southern Levant, indicating the approximate extent of the Lisan Lake and the late Pleistocene shoreline

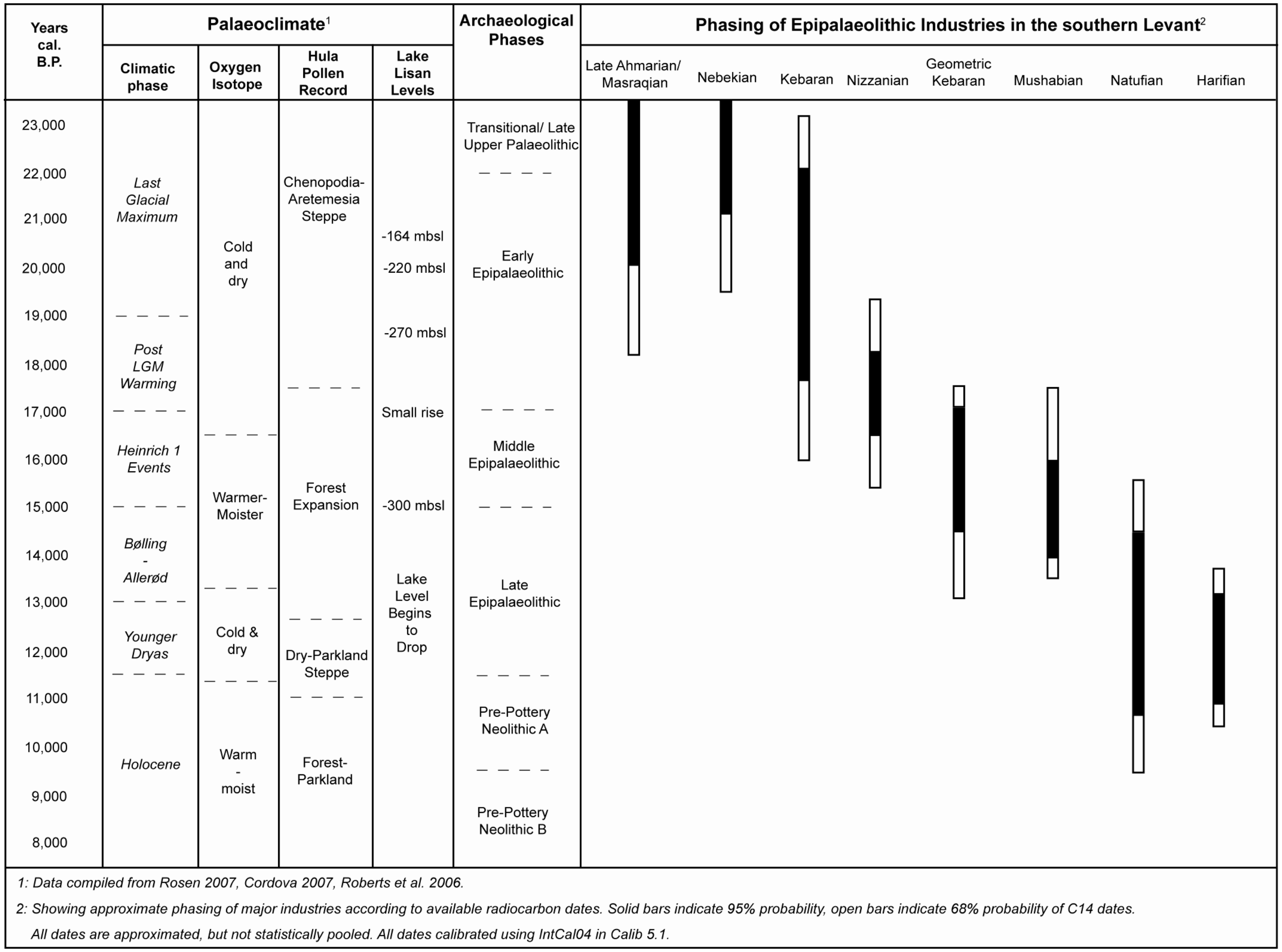


Figure 2.4: Chronological chart of major climatic and palaeoenvironmental events, and the approximate duration of the major late Pleistocene lithic industries, based on available calibrated radiocarbon dates (solid indicating 68% of distribution and blank indicating 95% distribution).

Crucial for the modelling of the effects of climatic changes on human groups in the region is a geographical understanding of the southern Levant as partitioned into an environmental mosaic (Bar-Yosef & Belfer-Cohen 1989, 1991; Bar-Yosef & Meadow 1995; Goring-Morris & Belfer-Cohen 1998; Henry 1989: 57; see Figures 2.5 and 2.6). Modern phyto-geographical zones are used as a basis to understand localized environmental conditions and are modelled using the climatic framework outlined above. The identification of these different vegetational zones is based on modern observations of plant distributions (Zohary 1962; Zohary 1973) and compared against the general climatic model, as well as environmental data from regional data sets (e.g., pollen cores from the Ghab and Huleh, geomorphological studies, speleotherms, and data from archaeological sites) to extrapolate the extent of vegetation zones in the past. These zones expanded or contracted following climatic amelioration or deterioration, although their basic lateral distribution varied only around the edges (Figure 2.5, 2.6). They are understood as fairly homogeneously-constituted environmental regions, which either provided favourable or not so favourable conditions for human groups, depending on the biodiversity, biomass productivity and resulting carrying capacity (e.g. Henry 1989, 1995). Human populations aggregated or dispersed in these different environmental zones, according to the prevailing climatic and environmental circumstances.

Early Epipalaeolithic groups are thought to have been concentrated in the Mediterranean zone during the LGM, when conditions were cold and dry throughout the region, since this area would have provided abundant resources for human exploitation. Territories were accordingly tightly packed in this area (Bar-Yosef 1989; Bar-Yosef & Belfer-Cohen 1989, 1991, 1992; Bar-Yosef & Belfer-Cohen 2000; Goring-Morris & Belfer-Cohen 1998; Goring-Morris et al. 2009; Henry 1989, 1995). Until recently it was thought that the surrounding arid Saharo-Arabian and semi-arid Irano-Turanian zones were more or less unoccupied during this time period (Bar-Yosef 1981, 1987b, 1989; Bar-Yosef & Belfer-Cohen 1989; Marks 1977). Although this appears to be the case for the Sinai and Negev where very few early Epipalaeolithic sites have been located to-date, other regions appear to have been extensively used by human groups (Byrd 1988; Byrd & Garrard 1989; Garrard, Baird & Byrd 1994; Garrard et al. 1988; Garrard & Byrd 1992; Henry 1988a, b, 1995; Marks 1977) It is argued that with the climatic amelioration following 19,000 cal B.P., the Irano-Turanian shrub vegetation expanded at the expense of the Saharo-Arabian desert and populations gradually expanded out from the Mediterranean 'core'. Thus, semi-arid and arid zones are implicitly understood as marginal, since less food resources were available here. This geographical and environmental dichotomy between a rich core and an impoverished periphery is reinforced by the identification of distinct lithic traditions respective to each zone during the early and middle Epipalaeo-

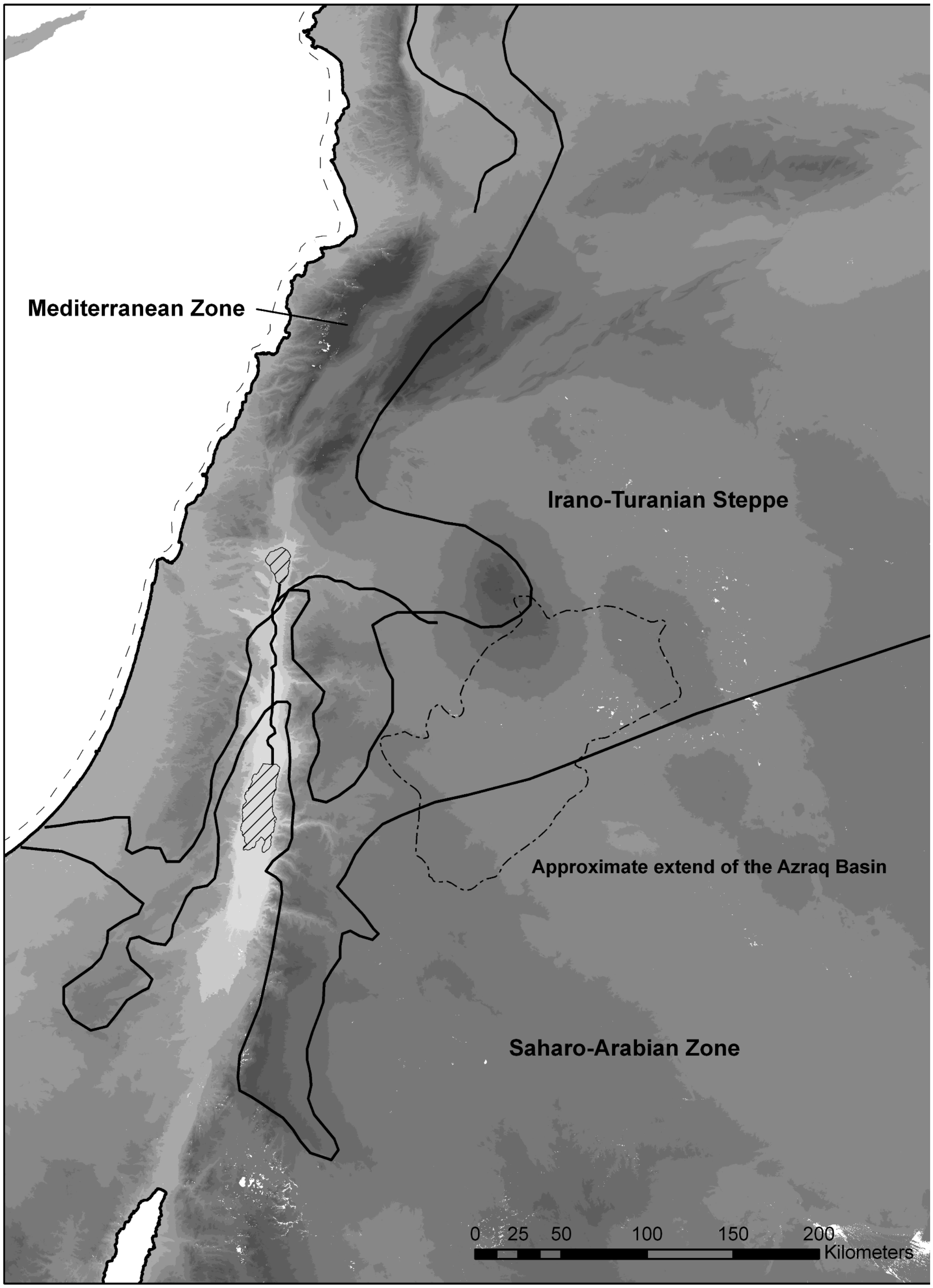


Figure 2.5: The distribution of phyto-geographical zones in the Levant

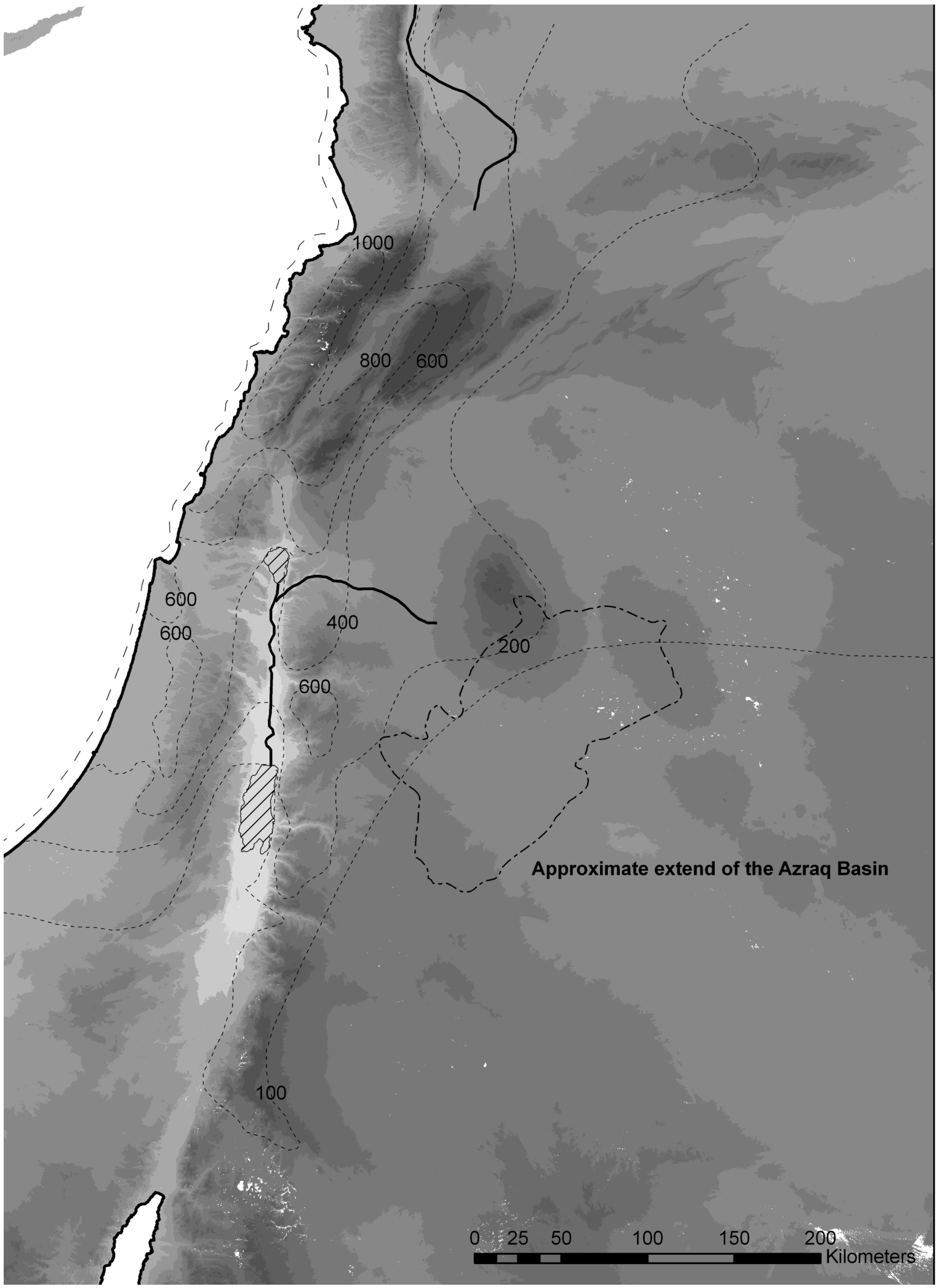


Figure 2.6: Average annual precipitation in the southern Levant

lithic. Nebekian, Qalkhan, Mushabian and Ramonian assemblages have been identified only in the marginal zones and thus are seen as desert-specific adaptations of final Pleistocene hunter-gatherer groups (Byrd 1998; Byrd & Colledge 1991; Byrd 1994a, b; Goring -Morris 1995; Goring-Morris & Belfer-Cohen 1998; Goring-Morris 1987; Henry 1989, 1995). With increasingly favourable conditions throughout the region it is argued that population sizes began to increase, signified by higher diversity in the microlithic chipped stone component and the presence of more sites across the region (Bar-Yosef & Belfer-Cohen 1989, 1991, 1992; Goring-Morris 1995; Goring-Morris & Belfer-Cohen 1998; Henry 1989). Resource competition in the semi-arid parts of the Negev/Sinai and southern Jordan is seen as one of the reasons for populations aggregating in the more temperate Mediterranean zone, where abundant resources, including wild barley and wheat stands, were now available. This agglomeration of people led to the emergence of the late Epipalaeolithic 'Natufian Culture' in the Mt. Carmel, Galilee and Jordan Valley core region, where an abundance of early sites from this period are located (Bar-Yosef 1998; Bar-Yosef 2004; Belfer-Cohen 1991; Valla 1995).

The movement of populations in and out of the southern Levantine phytogeographical zones is identified using techno-typological characteristics of chipped stone artefact assemblages. Core reduction sequences, presence or absence of the microburin technique, as well as differing frequencies of microlith forms have been used to identify and delineate different socio-cultural groups (Bar-Yosef 1970, 1981, 1989; Bar-Yosef 1991; Bar-Yosef & Belfer-Cohen 1989; Bar-Yosef & Vogel 1987; Fellner 1995a; Goring-Morris 1995; Goring-Morris 1987; Henry 1989: 81-89, 118-123, 155-156, 170-175; 1995). Tool production methods and microlith morphology are seen to reflect stylistic choices of Epipalaeolithic knappers, which in turn reflect cultural traditions. While some have gone as far as suggesting that the observed variability in lithic assemblages relates to distinct ethnic communities (Bar-Yosef 1991; Bar-Yosef 1998; Henry 1989, 1995), others have argued that technological aspects also had a significant impact on assemblage (Neeley & Barton 1994). The identification of particular cultural regions in the southern Levant depends on isolating these stylistic attributes of the chipped stone assemblages within a confined space. Based on suddenness and subtle changes in these attributes, population movements, replacements, mixing or the diffusion of technological traditions (i.e., contact between different groups) have been postulated. Typologically, the early Epipalaeolithic is characterized by a high degree of diversity in microlith tool forms, evolving gradually from non geometric to geometric forms toward the middle Epipalaeolithic. A distinction between chipped stone assemblages in the western and eastern Levant has been drawn, based on differences in non-geometric microlith shapes. Eastern

Levantine assemblages are now described as Nebekian, while western Levantine assemblages retained the label Kebaran (Belfer-Cohen & Goring-Morris 2003; Goring-Morris 1995; Goring-Morris & Belfer-Cohen 1998; Olszewski 2001b, 2006; Stutz & Estabrook 2004). Other regional facies exist in southern Jordan, such as the Qalkhan during the early Epipalaeolithic and the Madamaghan during the middle Epipalaeolithic, although these are not widely recognized by all scholars and have been subsumed under existing labels by others (Goring-Morris 1995; Goring-Morris & Belfer-Cohen 1998; Olszewski 2001b, 2006). For example, in the western Levant, Geometric Kebaran assemblages are contemporaneous with the Mushabian tradition of the Sinai/Negev, and both are middle Epipalaeolithic entities. The contrast between industries in the Mediterranean vegetation zone (the Kebaran) and those in the semi-arid and arid regions of the southern, south-eastern and eastern Levant is often characterised as a unidirectional relationship in which crucial cultural changes occurred first in the Mediterranean zone, before permeating to the periphery (Bar-Yosef 1981, 1987b; Bar-Yosef 1996; Bar-Yosef & Belfer-Cohen 1989, 1991, 1992; Bar-Yosef & Belfer-Cohen 2000; Bar-Yosef & Meadow 1995; Goring-Morris & Belfer-Cohen 1998; Goring-Morris 1987; Henry 1989, 1995), others have suggested that this process was more reciprocal with elements of arid zone adaptations diffusing into the core zone (Byrd 1994b; Henry 1989, 1995). Byrd (1989; 1998; 1994b; Byrd & Garrard 1989; see also Garrard & Byrd 1992) has shown that the first use of the microburin technique[3], for example, is evident in the Azraq Basin of eastern Jordan at around 21,000 cal B.P. This predates the adoption of the technique in the western Levant and therefore suggests a significant technological influence deriving from outside the core. The geographical dichotomy between the marginal zones and the Mediterranean core area is one of the key principles used to model changes in human settlement across the region and is not only reflected in the reconstruction of these zones, but also in the understanding of the lithic assemblages.

The emergence of Neolithic economies in the southern Levant is seen to be rooted in a slow evolution of economic strategies and social organization beginning in the final Pleistocene. Socio-cultural change from the LGM to the beginning of the Neolithic is understood as a gradual, unilineal process of increasing social complexity (Bar-Yosef 1987b, 1989; Bar-Yosef 1996; Bar-Yosef & Belfer-Cohen 1989, 1991, 1992; Bar-Yosef & Belfer-Cohen 2000; Fellner 1995a; Goring-Morris & Belfer-Cohen 1998; Henry 1989, 1995). Early and middle Epipalaeolithic groups are then described as highly mobile bands, subsisting mainly on hunting and gathering with low or no social hierarchies. This is generally described as a foraging life style or simple hunting and gathering mode

3: A method used to section bladelets using partial retouch and a burin side-blow applied on an anvil, used to produce microlith tool blanks.

(Binford 1968, 1980, 1983; Flannery 1969, 1972; Woodburn 1980). Aggregation within the Mediterranean zone during the late Epipalaeolithic period, which led to the emergence of the Natufian 'Culture', resulted in the adoption of a complex hunting and gathering (or collecting) way of life, which brought with it social hierarchies, sedentism and increased territoriality. The Natufian period is often described as an evolutionary threshold crossed by people on the road to agriculturally-based village life and is often seen as an evolutionary 'point of no return' (Bar-Yosef & Belfer-Cohen 1989; Bar-Yosef & Belfer-Cohen 2000). Complex hunting and gathering, it is argued, established the necessary preconditions for agriculture so that human populations became sedentary and eventually dependant on cereal resources. Following the climatic deterioration of the Younger Dryas, late Natufian groups expanded once again across the region to alleviate stress and lower the risk of settled life, before their successors eventually crossed the final evolutionary step to the adoption of agriculture. This social evolutionary narrative combines several elements of the current interpretation: social and political organization, changes in subsistence, settlement patterns, technology and social differentiation, as evidenced in the emergence of body ornaments, mobile art and burial grounds.

SOCIAL EVOLUTIONARY THEORY: BACKGROUND

Various aspects of the way in which this narrative has been written exemplify how the social evolutionary framework rests heavily on a Spencerian version of evolutionary thought. Change is unilineal and progressive; it is mainly associated with developments in subsistence (gatherer/hunters to farmers), and also affects the social and political constitution of Epipalaeolithic and early Neolithic societies. The driving force behind this transformation is climatic change. Although ecological approaches are therefore a crucial component of Epipalaeolithic archaeology in the southern Levant it also displays a primary interest in culture history. The influences on this framework are diverse, incorporating elements of Francois Bordes' (Bordes 1953, 1961) typological approach to the school of ecological archaeology. Typological classification and ordering of assemblages into archaeological industries, complexes, and cultures is seen as an initial step in the attempt to model the economic background of Epipalaeolithic groups in the region (Henry 1989). Social aspects play a subordinate role in these perspectives and are seen as a functional dimension relating to environmental and climatic changes, acting as mechanisms to reduce risk and thereby adapt to altering external conditions (Henry 1995: 342-343, 418-421, 434-436). Consequently, the concept of landscape is considered primarily from an economic and ecological perspective. In these landscapes, human agents play a seemingly insignificant role. Since cultural change is induced by forces external to society (e.g., climate, demography) the narrative suggests that human decision-making processes are preconditioned according to the necessities and practicalities determined by climatic and environmental change.

Landscapes are therefore considered as empty spaces into which resources, settlements and other external conditions are mapped by the modern observer (Barrett 1999; Bender 1999; Thomas 2001; Tilley 1994, 2006). There is little appreciation for the way in which such landscapes were *also* socially-constructed, perceived and lived in by people (Barrett 1994, 1999; Bender 1993b; Ingold 1993; Thomas 2001). This is because the paradigm of social evolution assumes *a priori* that hunter-gatherers are less able to shape or affect their environment than farmers, since they are socially and technologically less-developed. Farming societies are seen to have successfully domesticated plants and animals; a process widely held to symbolise humanity's success in controlling nature and rising above savagery (Barnard 2004; Ingold 1988, 1992, 2000; Pluciennik 2002b, 2004, 2005). Since hunter-gatherers have been defined on the basis of their mode of subsistence and did not domesticated plants or animals they are, by the same token, considered to reflect a more natural state of existence. They are passive agents within their landscapes, as landscape is primarily a natural, physical entity consisting of resources, topography, geology and vegetation.

The cultural historical approach inherent in artefact classification schemes and lithics typologies in the Epipalaeolithic, and the direct link made between type frequencies and specific phyto-geographical zones, further exemplifies a passive and naturalistic image of hunter-gatherers. The characteristics of lithic types are considered to reflect primordial cultural traditions or mental templates which are held in common by a specific social group. Some scholars equate these social units with ethnic groups, since it is argued kinship relations were their binding social fabric (Henry 1989, 1995). In this case, once again, hunter-gatherers appear to play an insignificant role in the creation of material culture. The use of typologies and cultural historical concepts to interpret the variability in Epipalaeolithic chipped stone assemblages also has important links to the idea of landscape. Various phyto-geographical zones are associated with different assemblages, which in turn are linked with specific social groups: Nebekian groups occupy the semi-arid to arid zone, while Kebaran groups occupy the Mediterranean zone. In the late Epipalaeolithic, Natufian groups are present in the Mediterranean zone, while Harifian groups were specifically adapted to the deserts of the Sinai and Negev (Goring Morris 1987, 1995). The spatial connection between lithic assemblage variability and landscape is used to support the idea that culturally homogeneous regions can be delineated and these areas can be considered as territories (Bar-Yosef 1991). This approach is reminiscent of the culture area concept as it was developed at the beginning of the 20th century by Kossina, and later expanded on by Childe (Jones 1997; Kossina 1911; Trigger 1989; Veit 1984, 2000). In the late Epipalaeolithic (Natufian) the presence of burials on many larger sites in the Mt. Carmel, Galilee and Jordan Valley is drawn on by some scholars to corroborate the idea of tightly packed and well-defined territories (Bar-Yosef 1991; Bar-Yosef 1998; Bar-Yosef & Belfer-Cohen 1989, 1991, 1992; Bar-Yosef & Belfer-Cohen 2000; Henry 1989; Valla 1999; Wright 1978). The concepts of space and landscape in this perspective are extremely static and inhabited by social groups who uphold territorial boundaries and act within these regions as economizing and rational beings. It has been argued that such conceptualisations reflect capitalist and nationalist definitions of how humans operate within space (Bender 1993a, 1999; Cosgrove 1984; Ingold 1988, 1992, 1993, 2000; Thomas 2001; Tilley 2006). While hunter-gatherers are also considered to act towards economic optimums within such spaces, they are interpreted as less able to affect the conditions of their existence since they are seen to occupy a less developed stage on the social evolutionary ladder. This cultural historical focus on bounded spaces containing specific techno-typological categories of lithics is also reflected in the distinction drawn between areas considered to be central to culture change and, on the other hand, those which are seen as marginal. This dichotomy is based on the aforementioned classification of different phyto-geographical zones (Figure 1.2).

A further indicator of the influence cultural historical frameworks have on the construction of the Epipalaeolithic sequence in the southern Levant is evidenced by scholars' interest in population movements and the diffusion of technological traditions (Bar-Yosef 1998; Bar-Yosef 2004; Bar-Yosef & Belfer-Cohen 2000; Fellner 1995a; Goring-Morris & Belfer-Cohen 1998; Henry 1989, 1995). Movements of groups into and out of territories, the basis of which are various environmental zones, is a key factor in explaining socio-cultural change. Once again, population movements are seen to be stimulated by climate change and the expansion or contraction of vegetational zones. The techno-typological characteristics of the chipped stone assemblages are the primary, and largely only, means by which these population movements are measured. Since other relevant data is rare this focus on lithics is understandable, although as many commentators have argued it does not provide a very good proxy to study how people may have moved around the landscape (Neeley & Barton 1994; Olszewski 2001a). The diffusion of lithic reduction techniques, primarily the microburin technique, is a further mechanism through which change in lithic technology and other realms is explained. Yet, no clear or coherent criteria have been established to distinguish when population movement or diffusion/cultural contact can be held responsible for changes in lithic technology. It appears that scholars employ either explanation almost at will. What the modelling of technological change within a cultural historical framework does, however, contributes to an image of a static and commoditised landscape. Thus objectified with territories and home ranges, landscape appears as voids. Cultural traditions, ethnic identities, human actions and movements are mapped onto the physical properties of the land, providing a static backdrop to model socio-cultural change according to preconceived notions about social complexity and progression.

INTERPRETATIVE PROBLEMS: RECENT FIELDWORK AND SOCIAL EVOLUTION

In this section I consider recent fieldwork results and reappraisals of the available archaeological and environmental data for the final Pleistocene Levant to argue that the currently available evidence for a straightforward, unilineal social evolutionary narrative of the Epipalaeolithic period in the southern Levant is problematic. I intend to demonstrate that the reconstruction of distinct phyto-geographical zones in the Levant and final Pleistocene settlement patterns are poorly correlated and that it is difficult to link changes in the archaeological record with climatic and environmental deteriorations or ameliorations. Based on recent fieldwork results from a number of key sites in the region, it can furthermore be argued that early and middle Epipalaeolithic communities were anything but simple hunter-gatherers. In addition, various publications have in recent years begun to question the status of the late Epipalaeolithic (Natufian) as a complex hunting and gathering society and of the early Neolithic (PPNA) as a straightforward agricultural society. These works provide further indication that the simple to complex unilineal sequence proposed by social evolution is not applicable to the cultural changes and phenomena witnessed in the southern Levant.

Models of social change in the Epipalaeolithic southern Levant rely heavily on the distinction between different environmental zones in this region, as outlined above. While accurate in principle the problems with this concept of phyto-geographical zones lies in the disjuncture between the modern reconstruction of plant distributions and the available palaeoclimatic data. Although the overall palaeoclimatic sequence in the southern Levant is reasonably well-understood (Cordova 2007; Robinson 2006; Rosen 2007), local and sub-regional climatic records are only patchily preserved. The vast majority of the local data derives either from botanical and faunal remains from sites or geoarchaeological studies on and in the vicinity of sites. Yet, this data is associated with two problems. First, botanical and faunal materials from archaeological sites can only ever provide an indirect picture of palaeoenvironmental conditions since the plants and animals that compose the archaeological record are subjected both to human and other taphonomic processes (Bar-Oz 2004; Bar-Oz & Dayan 2003; Bar-Oz 2002; Colledge 2001; Stiner et al. 2001). Often, this limiting factor is neglected in palaeoenvironmental studies in the region, which uncritically relate this data to larger scale environmental changes (Henry 1989). Secondly, this data often represents minutiae of past ecological conditions and lacks the chronological longevity of and association to long duration, pan-regional palaeoclimatic records. Apart from this issue, the vast majority of this data derives only from faunal and geoarchaeological data since botanical remains are extremely scarce for the early and middle Epipalaeolithic (Colledge 2001). The detailed expansion and contraction cycles suggested for the phyto-geographical zones may therefore be indicative of a general pattern, but cannot account for the immediate and local character of palaeo-ecological conditions. Local and regional variation in topography, hydrology and geology are not taken into account rigorously enough, although it is these immediate and local environments that people had to cope with and live within.

Various inconsistencies in other palaeoclimatic datasets for the southern Levant can also be noted. The Hulah and Ghab pollen cores, which have been used as the primary terrestrial datasets for the reconstruction of climatic patterns in the southern Levant (Baruch 1994; Baruch & Bottema 1991; Bottema & van Zeist 1981; Butzer 1975, 1978; van Zeist & Bottema 1982; Zohary 1973), have recently been shown to be inaccurately dated (Meadows 2004). Meadows (2004) has argued that reservoir effects in the dating of these pollen profiles have not been taken into account adequately, resulting in uncertainties over the vegetational chronologies. Although overall vegetation changes are adequately recorded in the pollen diagrams from both locations, Meadows argues that they are unsuitable to understand more immediate, local patterns of vegetation. The Ghab and Huleh pollen cores provided one of the key means to reconstruct final Pleistocene vegetation changes in the region and provided one of the key links between local, pan-regional and global palaeoenvironmental datasets. Since the inaccuracies outlined by Meadows (2004) show that local vegetation changes are difficult to reconstruct on the basis of these pollen cores, this link has been severed. Palaeoenvironmental data from the Azraq Basin Early Prehistory Project, further appears to contradict some of the overall climatic reconstructions for the region (Garrard 1998; Garrard, Baird & Byrd 1994). While global climatic data shows that the Last Glacial Maximum in the southern Levant was characterised by more cool and dry conditions than at present (Bar-Yosef 1987b, 1989; Cordova 2007; Robinson 2006; Rosen 2007) sedimentary data from sites in the Azraq Basin, which are comparatively well-dated, show that cool but wet conditions may have existed in the eastern Levant (Byrd & Garrard 1989; Garrard 1998; Garrard, Baird & Byrd 1994;

see also chapter 5 & 6; Garrard, Baird, Colledge et al. 1994; Garrard et al. 1988). This further indicates that local environmental and ecological conditions can be quite variable and do not necessarily fit to the overall picture of climatic reconstructions. Lastly, problems arise in the chronological correlation between climatic change, the expansion/ contraction of phyto-geographical zones, and settlement patterns. Radiocarbon dates from archaeological sites in the region are too sparse to allow for a coherent link between these diverse lines of evidence (Byrd 1994b). Only rarely are sites, such as Ohalo II, furnished with sufficient C14 dates to limit the statistical range of dates from occupation horizons. Cluster dating of occupation surfaces has too rarely been undertaken to situate assemblages and sites more consistently in the larger scale climatic and environmental datasets. With the local link between environmental data and archaeological sites severely compromised there are clear issues in linking long-term climate changes directly with the archaeological evidence for social, economic or political changes. The correlation of general climatic changes with both localized environmental alterations and general socio-cultural change therefore appears somewhat problematic, since the data does not allow a very tight fit of these different data. For this reason, the supposed driving force behind social evolutionary change in the case of the southern Levant is not very well understood and of limited usefulness to facilitate a more holistic understanding of the final Pleistocene social and cultural phenomena.

Preconceived notions about the transition from simple hunter-gatherers to complex collectors and farmers have also hindered progress in appreciating the variable and knowledgeable way in which final Pleistocene groups operated within their habitats. This is because social evolution is considered to exist *a priori* as a cross-cultural principle, which necessitates a unilineal progression from simple adapted forms to more complex social systems. Archaeological evidence from the southern Levant which has come to light in recent years indicates, to the contrary, that a simple to complex social evolution cannot be assumed in any straightforward manner. This is not to say, however, that changing climatic conditions did not affect communities in the southern Levant or elsewhere, between 22,000 and 10,500 cal B.P. Rather, I would argue that in considering the relationship between humans and environments, we ought to focus on the reciprocal aspects of this duality by considering it in a more holistic way. This requires, on the one hand, better palaeoenvironmental data and a move away from environmental determinism toward an understanding of humans as active and knowledgeable agents.

Excavations at the early Epipalaeolithic site of Ohalo II on the western shore of the lake of Galilee have produced evidence that challenges the notion of a foraging mode of subsistence in the early Epipalaeolithic. The site, which dates to c. 23.000 cal B.P. and consists of a series of brush huts, hearths, pits and a single human burial. It was exceptionally well-preserved in fine lake sediments which facilitated the survival of abundant charred seeds of various grasses and fruits (Kislev et al. 1992; Kislev 2002; Weiss et al. 2004; Weiss et al. 2005). In total c. 90,000 charred specimens were recovered, representing 100 different plant species, 30 of which were edible. These included wild barley and emmer wheat which became the first domesticates during the early Neolithic period (Zohary & Hopf 2000). That the presence of these remains was not purely accidental was recently confirmed by starch grain analysis of a ground stone grinding slab from the site, which produced evidence for the grinding of wild barley and possibly wild emmer, as well as a series of other wild grasses (Piperno 2004). Ground stone tools found at the site were also closely associated with charred seeds. Based on the seasonality of the microbotanical plant taxa (Kislev et al. 1992; Kislev 2002; Weiss et al. 2004), as well as on sedimentological data (Tsatskin 2002; Tsatskin & Nadel 2003), Nadel suggests that Ohalo II was occupied at several points throughout the year, perhaps even year round (Nadel 2002, 2004a; Nadel 2004b; Nadel 2006). This is supported by fine-grained stratigraphic evidence, which shows the successive superposition of living floors inside some of the brush huts (Nadel 2004a, 2006). If, as the evidence suggests, wild cereals were intensively procured as part of the plant food economy and the site enjoyed year round occupation it can be argued that the developments considered as revolutionary or culminating during the late Epipalaeolithic (Natufian) were not a critical as they may seem. Rather than following a simple mode of foraging, Ohalo II's inhabitants' food procurement practices were characterised by diversity and plant knowledgeability, which betrays the simplicity of the simple-foraging/complex-collecting model.

Conventional constructions of the Epipalaeolithic sequence in the southern Levant have highlighted the importance of the late Epipalaeolithic (Natufian) as a socially-complex, sedentary hunter-gatherer culture. Yet, the nature of the late Epipalaeolithic appears far from clear, since both late Epipalaeolithic sedentism and social complexity can be contested. The presence of stone architecture, heavy duty ground stone implements (e.g., pipe mortars), burials, certain commensal faunal species (e.g., house mouse, house sparrow and rats), storage features and the substantial thickness of archaeological deposits at some sites have all been taken as indicators of Natufian sedentism (Bar-Yosef 1998; Bar-Yosef 2004; Bar-Yosef & Belfer-Cohen 1989, 1991, 1992; Bar-Yosef & Meadow 1995; Henry 1989). Critique of the use of architecture as an indicator of sedentism has already been voiced by Edwards (1989b) and others (Olszewski 1991b). More recently, Boyd (2006) has offered a more substantial critique of Natufian sedentism, and has pointed to various inconsistencies in all of the lines of evidence noted above. He argued that ground stone implements cannot be taken as direct indicator of more permanent settlement, even if they were not transportable. Instead, he demonstrates that the raw material used to make ground stone tools reflects a procurement pattern that indicates a high level of mobility (Weinstein-Evron et al. 2001). Furthermore, Boyd (2006) cites critiques of the biological indicators for sedentism (Tangri & Wyncoll 1989; Wyncoll & Tangri 1991), to show that the presence of house mice, sparrows and rats in Natufian faunal assemblages is far from straightforward (but see Tchernov 1991). Based on his own research Boyd, argues that cemeteries, at times, predate the establishment of settlements and may therefore relate to more significant social and symbolic practices than simply the marking of territory as an outcome of sedentism (Boyd 2001). In the same instance, Boyd (2006) points to the rarity of Natufian storage features (which are mainly known from Hayonim Terrace and Mallaha), and also supports Hardy-Smith and Edwards' (Hardy-Smith & Edwards 2004) findings that argue for high Natufian mobility based on refuse discard patterns at Wadi Hammeh 27. Taken together, Boyd's (2006) and Edwards' (Edwards 1989b; Hardy-Smith & Edwards 2004) work amounts to a substantial critique of the notion that early Natufian groups were sedentary, and challenges one of the key aspects of the late Epipalaeolithic evolutionary sequence.

In relation to Natufian sedentism, if at all present, a further problem for a unilineal, social evolutionary story arises from the suggestion that late Natufian groups reverted to a higher degree of mobility (Bar-Yosef & Belfer-Cohen 1989, 1991, 1992; Bar-Yosef & Belfer-Cohen 2000). Decreases in site size, the decline of architecture, as well as changes in the burial record have been seen as indicators of increased mobility. It is suggested that the reason for higher mobility during the late Natufian was the climatic deterioration that occurred with the onset of the Younger Dryas, which caused depletion in available resources. This, in turn, resulted in a dispersal of populations across the region to maximise return within different areas and alleviate risk. However, even if one was to accept that different levels of sedentism or mobility could be detected on the basis of architecture, site size, and the nature of cemeteries (see above), it seems confusing that a more or less unilineal social evolutionary sequence persists, while it is argued that certain aspects of this development did not proceed in this manner. In the literature this is commonly referred to as punctuated equilibrium (Bar-Yosef & Belfer-Cohen 1991, 1992), which suggests a cyclical evolutionary development. Nevertheless, despite being characterized as a periodic process it is nevertheless basically progressive and developmental. Evidence from the late Epipalaeolithic levels of Abu Hureyra, however, contradicts the notion that all groups during this period were more mobile (Moore 2000; Moore 1992). Leaving aside the issue in how far Abu Hureyra represents a classic Natufian site or not (Belfer-Cohen 1989; Olszewski 1988, 1991a), micro-botanical and faunal remains suggest inhabitants were at the site year-round. This evident variability in settlement patterns, land use and subsistence practices is far from adequately explained using the ideas of a punctuated equilibrium or social evolution.

Decorated burials from the early Natufian are often cited as evidence for social hierarchies (Bar-Yosef 1998; Bar-Yosef 2004; Bar-Yosef & Belfer-Cohen 1989, 1991, 1992; Bar-Yosef & Belfer-Cohen 2000; Henry 1989; Wright 1978) and therefore feed into the idea of social complexity, an elemental aspect of the argument that the early Natufian was a complex hunter-gatherer society. Wright (1978) argued that social differentiation was detectable in the Natufian cemetery from el-Wad on the basis of age differences and the predominance of grave goods in certain burials. This work was criticised by Boyd (2001), who suggested that the early excavations of el-Wad on which Wright's research was based, were too biased due to the excavation and retrieval methods used at the time to allow for such detailed reconstructions (see also Belfer-Cohen 1995; Byrd & Monahan 1995). Crucially, he also suggested that the underlying principle of identifying social differences on the basis of grave goods and demographic differences was inconsistent. Byrd and Monahan (1995) also rejected the idea of individual differentiation on the basis of wealth and status, and attributed the variability in the late Epipalaeolithic burial record as markers of personal and group identities instead. Boyd's (Boyd 2001) work shows how another key aspect of the social evolutionary narrative can be deconstructed, if the evidence is scrutinized in detail. It seems that many aspects of the Natufian narrative, as a complex hunter-gatherer society, are often constructed in a pre-determined perspective. Rather than drawing on the variability of human practices during the late Pleistocene, archaeologists have been keen to fit the available data into a narrow, pre-conceived social evolutionary scheme.

Chipped stone typologies have been used to promote a long sense of continuity in the Epipalaeolithic of Southwest Asia (Bar-Yosef 1991; Pirie 2004). Using the idea of proto-type forms (e.g., proto-lunates, proto-triangles) as precursors to middle and late Epipalaeolithic microlithic tool types, connections between the various stages of the Epipalaeolithic are made. Again, it is interesting that a backward trajectory is constructed starting from Natufian or Geometric Kebaran material culture, to assign meaning to these proto-types, because the principal forms are present as lunates or triangles in the Natufian and Geometric Kebaran, respectively. Pirie (Pirie 2001, 2004) has criticised this promotion of continuity and the idea of gradualism that is expressed in the emphasis placed on geometrization in microlithic tool forms.

Bar Yosef-s temporal creation elegantly links the future with the past in a way that prefigures later developments. Tools in earlier sites came to have within themselves the potential for later tools. These significant types thus represented the implicit future fulfilment of a trend of tool morphology and associated cultural development. Continuity of tradition over the entire period was thus assured through the use of continuous variables such as measurements, and pseudo continuous variables, such as morphing tool forms and assemblage proportions." (Pirie 2004: 690).

Bar-Yosef's typological scheme has been reproduced by other scholars working in the region (e.g. Goring-Morris 1987), although not all have followed his idea of proto types. However, it seems clear that almost all scholars accept a cultural continuity that connects the various Epipalaeolithic entities across time (see above). The microburin technique is used as another indicator to track cultural connections or populations movements (Henry 1974, 1989, 1995). Pirie's (2001, 2004) work has shown how far typological series are archaeological constructs; narratives of the past that do not necessarily separate observation and interpretation. At the same time, Neeley and Barton (1994) have cast considerable doubt on some of the typological methods and ideas underlying the study of the Epipalaeolithic periods (but see critical responses by Fellner 1995b; Goring-Morris 1996; Henry 1996; Kaufman 1995; Phillips 1996). Although typologies remain useful tools for archaeologists generally, considerable doubt has been cast on the meaning of such typologies for the understanding of past socio-cultural processes (Adams & Adams 1991; Hodder 1982a, c, 1986; Jones 1997; Renfrew 1987; Trigger 1995). It is now accepted by most scholars that ethnicity cannot be inferred on the basis of one or two traits evident in material cultural remains, even in conditions where a wide range of material culture is available. Studies of ethnicity in ethnography and the modern world reveal how ambivalent this concept is and how variable and contextual its expression or invisibility can be (Anderson 1991; Jenkins 1997). Apart from these epistemological issues, problems persist in the application of typologies in the Epipalaeolithic of the southern Levant. Different analysts employ variable systems of classification for lithic assemblages and there is little common understanding of how to recognize distinct types of microliths (Olszewski 2001a). The identification of particular social groups and movement of or contact between them is therefore fraught with conceptual and epistemological problems. There is no clear correlation between typological classification, ethnic/cultural groups and the movement of populations, since we are unable to assess whether the different types identified by archaeologists are either discrete entities or had any meaning to past agents in the first place.

The issue of evolutionary continuity and unilineal development from simple to complex societies at the Pleistocene/Holocene interface is further challenged by recent research that indicates a fundamental reconceptualisation of early Neolithic communities in the southern Levant. Although many innovations appear in the archaeological record during the early Holocene, several elements of the material culture appear to remain fairly similar. Belfer-Cohen (Belfer-Cohen 1994), for example, discussed the continuity from late/final Natufian to early PPNA lithic technology in the Jordan Valley. Architecture, site size and density of occupation also remain fairly comparable to the preceding late Epipalaeolithic. In the absence of clearly identifiable domesticated plant species and given the relative importance of game animals in the faunal spectrum on many sites, it seems that many scholars have moved away from considering the PPNA as a strictly Neolithic entity (Kuijt & Goring-Morris 2002; Mithen 2000). Instead, the early Holocene communities were still characterised by fairly high mobility, relying on wild resources to a great extent. Furthermore, the archaeological evidence for the PPNA also displays a great deal of variability, in particular in relation to different parts of the Levantine landscape. Many scholars now consider a fully fledged Neolithic economy not to be present prior to the Pre Pottery Neolithic B (PPNB) (Kuijt & Goring-Morris 2002). This shows that different trends, social and cultural processes took place throughout the region, and that the developments were anything but uni-directional.

A number of authors have also pointed out how various cultural aspects of the Neolithic can be traced back to the earlier, pre-Natufian Epipalaeolithic. Watkins (Watkins 2004a; Watkins 2004b, 2005b) has discussed the longevity of some of the cognitive processes he considers to have been crucial to the emergence of the Neolithic, and locates them amongst earlier Epipalaeolithic groups. More recently, Hodder (Hodder 2007) has discussed how the repetitive use of space occurred at various points in the Southwest Asian prehistoric sequence, and how they became gradually more pronounced and accentuated towards the later Epipalaeolithic and during the Neolithic. Considering the connections across these chronological horizons shows more of the similarity between the cultural expressions that characterised the earlier Epipalaeolithic and the Neolithic, rather than emphasising that there were critical, evolutionary shifts and breaks in terms of subsistence and settlement patterns. The emerging picture challenges the view that the early Neolithic was revolutionary, and provides further evidence that a unilineal cultural evolution is in contrast with the archaeological evidence. In conjunction with evidence from late/final Natufian contexts, as well as early Epipalaeolithic Ohalo II, socio-cultural changes at the late Pleistocene/early Holocene transition appear far from straightforward.

SOCIAL EVOLUTION AND LANDSCAPE: EPISTEMOLOGY

In the context of Levantine prehistory few scholars have critically reflected on the underlying assumptions and biases inherent in a positivist approach to landscape and social evolution in south Levantine prehistory (Boyd 1999, 2002, 2004; Verhoeven 2004). With regards to the wider archaeological and anthropological literature, further problems with this narrative can be raised. For at least a decade various scholars have pointed out that social evolutionary theory in archaeology and anthropology can be closely associated with the emergence of modernity (Shanks & Tilley 1987a, b; Thomas 2004). Thomas (2004) in particular has recently outlined the philosophical underpinnings relating to modernity that have contributed to the emergence of archaeology as a discipline in the humanities. At the heart of the metaphysical structure of social evolutionary thought we can identify a dichotomy between nature and culture, which is perhaps the key characteristic of rational Enlightenment thought (Boyd 2002, 2004; Ingold 2000, 2002a, b, 2004). This dichotomy, rooted in the Cartesian dualism between mind and body, is directly related to the qualitative categorisation of societies and in the adoption of narrow functionalist and materialist approaches to material culture, landscape and processes of socio cultural change (Gosden 1994; Shanks & Tilley 1987b; Thomas 2004). In the last part of this chapter I would like to move from the contextual critique of the previous section to an epistemological evaluation of the idea of social evolution as currently practised implicitly or explicitly in Epipalaeolithic/Neolithic research in the Levant. In particular, I will suggest that the construction of social evolutionary narratives neglects the role of human agencies during the late Pleistocene Levant and has contributed to a conceptualisation of landscape as commoditized space, void of social interaction and agency.

Social evolutionary thought and the condition of modernity are closely related and draw on the same concepts and understandings of the world that have characterised the modern West since the seventeenth and eighteenth century (Ingold 2000, 2002b; Pluciennik 2005; Trigger 1989). These cosmologies emerged during the Renaissance and the Enlightenment periods, which represent the formative periods of modernity. On the one hand, scholars interested in the natural sciences became increasingly aware of the pre-classical antiquity of humanity through the discovery of flint tools and other artefacts (Thomas 2004; Trigger 1989). The possibility of recognising the antiquity of humanity became more plausible because merchants and explorers around the world came into contact with non-western societies for the first time, with cultural practices radically different from Renaissance Europe. On the other hand, radical changes in philosophy prompted a different understanding of human society and the natural world. Natural science and philosophy emerged in antagonism to Christian scripture (Thomas 2004: 8-9). These founding moments of modern western science and western expansion were to become the breeding ground for an understanding of human society based on the categorisation of people, the idea of rational progress towards a better society and the separation between nature and culture. This process of categorising the natural order was closely connected with a rational philosophy, which sought to comprehend the world through distanced observation and analysis, the application of reason, for which objectified classification was a prerequisite.

The gradual recognition of a pre-classical European past emerged out of the West's contact with non-western indigenous societies and the resultant recognition of alternative lifeways to the Classical ideal (Gosden 1999: 23; Shanks & Tilley 1987b; Thomas 2004: 51; Trigger 1989: 52-55). In addition, increasing interest in the natural world resulted in the collection of prehistoric artefacts, such as Palaeolithic handaxes, and in conjunction with the West's encounters with indigenous communities elsewhere, resulted in the recognition of a pre-Classical European past. The antiquity of humanity was seen as a historical process characterised by human advancement from one stage of cultural development to the next in a linear concept of time. During the Enlightenment this concept was formulated explicitly for the first time as scholars began to suggest that human society progressed through a series of stages.

> Enlightenment historical philosophy harnessed these ideas to a vision of the progressive perfection of human existence through the application of reason and construction of order. Generally, this process was understood as having begun with a state of 'nature', in which the absence of culture coincided with disorder. (Thomas 2004: 31).

While some, such as Rousseau came to see 'traditional', non-western societies as a form of human existence untainted by modern problems through their romantization as noble savages (Thomas 2004: 43), others believed that indigenous groups were inferior to western civilisation and its achievements. Non-western societies were seen as representatives of a past stage in human history long surpassed by the West. Consequently, the West was seen to represent the culmination of human achievement, a position which provided a justification to invade, colonise and exploit other, non-western societies (Gosden 1999a: 25). The idea of human advancement through several stages remained fairly generally formulated throughout the eighteenth century, and it was only during the nineteenth century that social scientists and economists argued much more explicitly for a separation of human societies into savages, barbarians and civilised nations (Gosden 1999; Pluciennik 2005; Shanks & Tilley 1987b; Thomas 2004; Trigger 1989). It is no coincidence that this strict delineation of stages of human evolution happened at the same time as Europe established more and more colonies around the world.

During the Enlightenment, philosophers became preoccupied with how humans could understand the nature of the surrounding physical world. Rather than relying on scripture as the only explanation of creation, science became the new key to unlock the unknown components of the natural world. The work by Newton and other natural scientists began to provide a different cosmological perspective on the world, mainly through the eyes of mathematics and geometry (Thomas 2004). The search for generally-applicable laws of physics now became the focus of natural scientists. This challenge to theology and philosophy prompted scholars to question the basis of humanity's understanding of the world. Philosophers like Descartes and Bacon devised new ways of questioning human knowledge about the world and how one could learn and understand more about the natural laws that affected it. While Bacon established the position of empiricism, Descartes was concerned with the application of pure reason, a position which became known as rationalism. For Bacon it was objects themselves that provided the crucial form of access to understanding the world, whereas for Descartes this had to be sought in the form of pure reason which was accessible through mathematics and geometry. For Decartes, human consciousness was the central principle upon which to base philosophical and scientific enquiry of the world. Like Descartes' rationalism, Bacon also mistrusted the senses in providing objective information about the world and suggested detailed observations, measurements and experiments had to be used to obtain knowledge of the object world. Fundamental to both these lines of thought then was the separation between the mind, where reason was thought to reside, and the body, which was the host of the senses. This fundamental distinction between mind and matter can be seen as the basis of both empiricist and rationalist philosophy and is one of the key concepts of modernity (Thomas 2004: 18). It also provides the basis for establishing the separation between nature and culture, individual and society, and a host of other dichotomous structures that shaped modern thought.

Essential to the concept of social evolution is an understanding of history as progressive and linear (Pluciennik 2005). With the Enlightenment, history came to be seen as a process characterised by change in human social and political organisation. Prior to the Enlightenment scholars interested in nature were mainly interested in classifying objects, plants and animals, but with the Enlightenment arose an interest in ordering the phenomena of the natural world into developmental chains of causality (Thomas 2004: 37). This perception of history could not have been possible without the recognition of humanity's antiquity which, although contested until the late nineteenth century, provided the basis to think about socio-cultural change long-term (Trigger 1989). Progress was considered as the gradual, increasingly sophisticated application of reason, leading to the establishment of better forms of social organisation and humanity's ability to overcome the difficulties posed to it by nature. The idea of progress was therefore seen as a process of separating humans further from the physical constraints of nature, both in terms of social organisation and technological ability. This provided the basis for ordering human societies into different types according to forms of social organisation, subsistence and technology and arranging them in a sequence that assumed a lack of reason at the lower and the use of reason at the higher end. The search for causality resulted in an interest in the origins of certain types of cultural phenomena, in order to explain their occurrence (e.g., writing, agriculture, urbanism). This, in essence, was one of the key contributing factors to the establishment of the discipline of archaeology (Thomas 2004: 39, 41), or at least prehistoric archaeology.

Although Enlightenment scholars had begun to differentiate various phases in human history, it was during the mid-eighteenth century that evolutionary narratives of humanity's social development became more explicit. This expansion of social evolutionary discourse can be clearly associated with western colonialism, the rise of capitalism and, at times, a racist attitude towards non-Western people (Pluciennik 2005: 16; Trigger 1989). Herbert Spencer and August Comte, the founding father of sociology, were the first to formulate the social evolutionary position explicitly (Noble 2000). Spencer, in particular, relied on a metaphor which stated that human society could be compared to natural organisms and that similar laws applied to the evolution of society as to biological evolution. Thus, the fittest or most efficiently adapted society was best equipped to survive and pass on its traits through natural selection. Technology and social organisation were the means by which a higher fitness could be guaranteed, and their development was a purely rational, economising endeavour. The idea of progress from one evolutionary state to another was again evident in Spencer's social typology, in which he ordered societies according to the complexity of social organisation and technology, suggesting that stages of savagery, barbarism, civilisation and states could be identified. Yet, for Spencer there were natural and inherent differences to be found in the various human races; he believed that certain human groups were preconditioned by nature to progress along the evolutionary path faster (Pluciennik 2005). As the West was considered the most advanced society, the conclusion was that the Western race was privileged above others, providing a justification for Western exploitation of other societies in the age of colonialism (Gosden 1999) Spencer established a framework of social evolutionary thought that proved compelling to many scholars. Marx, for example, copied Spencer's progressivist understanding of history, but saw the reasons for this progression as based in the struggle over the control of the forces of production (Noble 2000). Darwin's later work (Darwin 1871) was also influenced by Spencerian evolution and copied some of the racial sentiments of social typological classification of non-western groups (Ingold 2004).

The application of social typologies to archaeology became relevant again early in the twentieth century. It was Gordon Childe who is the singular most important figure in reinstating social evolutionary ideas in archaeology (Pluciennik 2005: 70-71, Trigger 1989: 254-259; Childe 1936), although he, like other cultural historical archaeologists, rejected evolutionism in favour of diffusionism at first (Trigger 1989: 173). But, Childe maintained, perhaps unconsciously, parts of the social evolutionary paradigm by applying typological systematics to the study of artefacts, which was based on a scale of stylistic and technological complexity. This classificatory scheme had its roots in an evolutionary conceptualisation of technology, which served as the basic idea behind Thompson's three age model and Montelius's typological ordering (Shanks & Tilley 1987b; Thomas 2004; Trigger 1989). In his later years Childe also promoted a view of history that was directional and characterised by increasing complexity of social organisation, which was part of his reorientation towards Marxism following the Second World War. This also reflected Marx's concept of historical progression (see above) as it is contained within Childe's later works, mainly *Man Makes Himself,* and therefore reflects a significant evolutionary influence. Yet, Childe and many other British archaeologists, such as Clarke, maintained a primary interest in historical processes; a tendency which was abandoned by many New Archaeologists as part of a commitment to neo-evolutionary ideas. Childe was also the first archaeologist to establish explicit links between forms of social organisation and subsistence, which led to the identification of hunter-gatherers with simple forms of social organisation and agriculturalists with a more developed type of political structure (Pluciennik 2005: 50, 70-71). With the rise in functionalist and ecological studies in archaeology, it appeared natural that evolution was once again a central concern to archaeologists and anthropologists. The neo-evolutionary, functionalist anthropology of Leslie White (White 1949a; White 1949b; White 1959) was one of the key developments in the reintroduction of social evolutionary ideas into anthropology and archaeology, and resulted amongst other things in the emergence of the New Archaeology.

Ethnographic fieldwork and anthropological theory also began to have a much more direct influence on archaeological interpretation, introducing evolutionary positions to the understanding of the past. The work of Sahlins and Service is of particular relevance here. While Sahlins (Sahlins 1960, 1968; Sahlins 1972) argued for a discontinuous process of evolution and put forward the idea of the original affluent society, Service (Service 1962) promoted a four-fold typology of social structures which could be used to understand the development of social, political and economic evolution. At the lowest stage of his typology were foragers who were seen to have the simplest forms of social organization and technology. In his eyes they were commonly organized in bands based on nuclear family units and there was no specific social organization evident beyond kinship. He labelled the next stage tribes, which had developed a basic form of social organization and which could be directly related to the emergence of food production. The last two stages were characterized by chiefdoms and states. Service's assumption, based on ethnographic data, that this scheme was universal was wholeheartedly adopted by archaeologists (Binford 1968, 1980, 1983; Flannery 1969, 1972). This social typology was increasingly used in archaeology to infer social complexity using economic data as a proxy. Where subsistence practices and mobility patterns corresponded to the ethnographic evidence, social organisation was also inferred. Forms of social organisation therefore partially depended on the interpretation of the economic basis of prehistoric societies, as well as cross cultural generalisation from the archaeological record, using ethnographic analogies to back up the arguments.

One of the key characteristics of this rise in neo-evolutionary theory was the adoption of an explicitly economic and socio-political outlook, rather than relying on race as evolutionary theorists in the nineteenth century had done. Forms of political organization, then, were the basis of the neo-evolutionary paradigm, which were also closely associated with different economies (Pluciennik 2005: 78). Trigger has argued (1989:124) that the new evolutionary paradigm was not endorsed by a majority of North American archaeologists, except perhaps in prehistoric archaeology. It became clear from early on that not all agreed with the fairly narrow social evolutionary scheme presented during the early 1960s. This was partially based on the results of the *Man the Hunter* conference, which contributed to a significant reconsideration of hunter-gatherer research (Lee 1968). Although hunter-gatherers now came to be seen in a somewhat romanticized way, which contrasted their apparent state of affluence (Sahlins 1968) with the ills of industrialised society (Pluciennik 2005: 83), the basic social evolutionary distinctions between hunter-gatherers and farmers were maintained. The socio-typological terminology *band-tribe-chiefdom* was reiterated particularly in the archaeological literature. While some sought to refine the understanding of hunter-gatherers by distinguishing between different modes of subsistence (Price & Brown 1985; Woodburn 1980), this was less an attempt to introduce more variability in the understanding of the past than to refine the social evolutionary stages already established (Pluciennik 2005: 83 84). Wooodburn's (1980) scenario distinguished between hunter-gatherers with an immediate return economy and a delayed return economy, while Price and Brown (1985: 7-16) also discussed the importance of hunter-gatherer complexity (see also Henry 1985 in the same volume). Similar to Woodburn, Binford (Binford 1968, 1980) introduced the idea of hunter-gatherer differentiation on the basis of subsistence economy in archaeology, in which he distinguished between foragers and collector type hunter gatherers. He approached this topic not just from an economic perspective, but also focused on site-formation and how it related to the archaeological record. The later twentieth century therefore saw again a rise in neo-evolutionary theory, which was characterized by a move away from race towards political and economic categories and attempted to understand hunter-gatherer diversity by introducing a more sophisticated sub-division of types of hunter-gatherer social organization.

In the past twenty to thirty years scholars from various disciplines have come to rethink the Enlightenment position that created the distinctions between nature/culture, mind/body and subject/object, as part of a post-modern movement affecting anthropology and archaeology. Although it is inaccurate to lump all of this work under the label of post-modernism, with its high degree of diversity, most scholars trace the origins of post-modernist thought to the philosophies of Nietzsche (Nietzsche 1995) and Kierkegaard (Kierkegaard 1983) who laid down the basis for the development of existentialist philosophy. Key thinkers of the anti-foundationalist movement, which developed out of existentialism, include Derrida, Wittgenstein and Heidegger. While all of these scholars questioned the epistemological foundations of rationalist and Hegelian philosophy in their own unique way, Heidegger (Heidegger 1962; Heidegger 1982) is perhaps the scholar whose work is most-cited to question subject/object and nature/culture dichotomies. In his search for defining human *being*, Heidegger broke down the distinction between the mind and the body by applying the concept of phenomenology to understand the nature of human existence. The use of phenomenology led Heidegger to understand existence as a *being-in-the-world,* which effectively meant that a constant dialectic relationship existed between mind and body through which *being* was conceptualized. The comprehension of existence, in human consciousness, therefore became seen as a constant, everlasting encounter between the mind and the body, an ongoing negotiation of meaning between matter and thought (Gosden 1994; Heidegger 1962; Heidegger 1982; Thomas 2004; Tilley 1994, 2004). Merleau-Ponty (1962) approached the same issue of phenomenology from a more sociological and ethnographic perspective, which related it as a concept of study more directly to the social sciences. His phenomenology also owed a lot to the previous work of Mauss (Mauss 1992) and was conceptually tied to Mauss perspective on the human body and the study of gestures and experience. Heidegger's argument had a lasting impact on certain segments of the philosophical and sociological community, resulting in the emergence of phenomenological, post-structural, hermeneutical and agency perspectives beginning with a so-called interpretative turning point during the 1970s (Bourdieu 1977, 1990, 1998; Derrida 1976, 1978, 1987; Descola & Palson 1996;

Foucault 1967, 1970, 1972, 1979, 1984; Giddens 1976, 1979, 1984, 1991; Latour 1991, 1996; Pickering 1995). The key aspect of adopting these various positions was that the critique of the nature/culture divide became more central to research, both in anthropology and archaeology (Boyd 2002, 2004; Fowler 2003; Gosden 1994; Hamilakis 2002b; see papers in Hamilakis & Tarlow 2002; Hodder 1982b, c, 1986, 1989; Ingold 1988, 1993, 1996, 1998; Pluciennik 2002a; Shanks & Tilley 1987a, b; Tilley 1994). The major criticism levelled by advocates of a post-modern archaeology was that the relationship between the environment and society, as well as between individual and society, had been posited as too much of a dichotomous relationship within earlier paradigms. This went hand–in-hand with a critique of positivism, model-building and testing associated with scientific, processual archaeology.

The key realization of the interpretative turn in the social sciences and humanities in respect to the nature/culture dichotomy was the idea of nature and culture, and the dichotomous relationships that arose from its application in almost all other realms of inquiry, were essentially a construct of modernist thought. The deconstruction of the discourse of modernity showed that these oppositions were drawn up as part of Enlightenment philosophy, but that they could not be assumed to naturally exist in other non-western or pre-modern societies, such as those traditionally studied by ethnographers and prehistoric archaeologists. Under the influence of this deconstruction of the discourse of modernity, ethnographers came to argue that the majority of non-western societies did not draw the same dichotomous distinctions (Bird-David 1990, 1992a, b; Ingold 1992, 1996, 1998). The artificiality of the nature/culture concept was highlighted and this allowed archaeologists to question whether it, and the models and theories based on it, could be applied to the past (Gamble & Gittins 2004)[4]. Social evolutionary theory had always considered the progression from simple forms of social organization to more complex ones as a rise of humanity above nature. The domestication of plants and animals in particular, associated with the onset of the Neolithic, was seen as the crucial step in which humans took control of nature, by cultivating and domesticating plants and taming animals. Landscape, equally, was seen as being brought into the realm of culture and tamed by constructing monuments, settlements and field systems[5]. The discourse on the Neolithic Revolution and the role of hunter-gatherers prior to the emergence of domesticated resources is thoroughly embedded in this dichotomous discourse of modernity (Boyd 2002, 2004; Gamble 2007; Pluciennik 2002b, 2004; Thomas 1991). It is possible to question whether Palaeolithic hunter-gatherers, or indeed Neolithic farm-

4: This simplistic dichotomy is often inadvertently reproduced by interpretative archaeologies focussing on the Neolithic or Bronze Age of northwest Europe. Some have created the impression that later prehistoric landscapes were 'sacred' and filled with myth and cosmological associations, while Mesolithic and Palaeolithic landscapes in which monumental structures did not exist were, thus, less 'cultured' or sacred. I will return to this issue in chapter 2 ers, drew such distinctions themselves or not. Rather than applying a subject/object perspective of the past in which the worldviews of ancient communities were not considered, archaeologies associated with the post-modernism take a more emic perspective of the past and attempt to move towards considering social organization, economy and adaptation within aspects of symbolism, ritual and gender (Boyd 2004; Hodder 1990; Thomas 1991, 1996). The central idea of progress in social evolutionary thought can therefore be rightly criticized for failing to take into account the variable nature with which people perceive and live in an environment and the manifold ways in which concepts of nature are socially and culturally constructed. It is therefore difficult to see how the idea of technological or social progress can be maintained, if hunter-gatherers were not more or less natural than the contemporary west.

This critique of nature/culture has also led a number of authors to reflect critically on the idea of social categorization in social evolutionary archaeology and anthropology. As I have outlined here, frameworks influenced by social evolutionary theory draw on a specific terminology, which is characterized by the use of classic labels such as band/tribe, forager/collector, hunter/farmer, simple/complex. The critique of the nature/culture dichotomy on the one hand, and the general critique of modernity on the other suggest that we have to rethink the applicability of these terms to the archaeological past. Pluciennik (2002b; 2004) amongst others (Barnard 2004; Bird-David 1990, 1992b; Ingold 1988, 1992, 2000) has highlighted problems with the juxtaposition between hunter-gatherers and farmers, and simple or complex hunter-gatherers, arguing that it essentially reproduces modern sentiments about the importance of subsistence. More generally, the band-tribe-chiefdom-state typology of social organization has also been effectively challenged on the basis of ethnographic fieldwork (Gosden 1999: 102-105), which shows that most groups used by Sahlins and Service to construct their social typologies were not pristine. Rather, these forms of social organization were a result of colonial contact or historically-dependant developments. This is further reinforced by ethnographic fieldwork which shows how problematic it is to distinguish between hunting, gathering and farming economies in contemporary, non-western societies (Bird-David 1990, 1992b; Layton 1991); therefore, how could a universal scheme of social evolutionary stages be applicable to other societies, past or present? Finally, the importance placed on subsistence as a major attribute for categorising human groups can be closely associated with the preoccupations of many thinkers in Enlightenment and post-Enlightenment Europe (Pluciennik 2001, 2005; Thomas 2004). The basis of the social evolutionary approach then, i.e. the classification of human groups on an axis of complexity in terms of subsistence, technology and social organization, can be challenged because it reiterates the nature/culture dichotomy and, more importantly, because variation in the ethnographic record does not support these categories. There is a further, more ethical dimension, to this process of categorisation. Its origins in the colonialist and imperialist context of the eighteenth and nineteenth century are problematic for our understanding of human cultural diversity and interaction today. Archaeologists and anthropologists have become very aware of the social and political ramifications of their classificatory approach, as it still supposes a particular relationship between dominated and oppressors.

Taken together, the critique of the idea of progress and the universal applicability of social categories demonstrates how problematic the social evolutionary approach is conceptually. However, a further important point can be raised in relation to social evolutionary schemes that try to explain socio-cultural change. Because social evolution is concerned with the application of an all-encompassing meta-narrative of cultural change, it can only consider the macroscopic, meta-historical aspects of socio-cultural transformations. As such it seeks to explain these changes in terms of large-scale processes, usually climatic or demographic change. As Pluciennik (2005: 133) argues,

> A generalizing concept such as social evolution, by positing metahistorical and transhistorical trends, must rely on structures and processes ultimately or largely outside the control of individual or even collective actors.

It can be argued on this basis that social evolution denies the agency of groups and individuals to effect change on the environment and culture. By placing all explanatory mechanisms outside of the realm of the everyday social practices, people play an insignificant role in the shaping of their social and historical realities. This position is also reflected in the use of a narrow materialist and functionalist approach to material culture, and in the perceived need to apply models of economic foraging or adaptive behaviour. Aspects of technology or resource exploitation are viewed from the perspective of evolutionary advantages or adaptiveness. This denial of agency is clearly at odds with recent developments in the anthropological and archaeological literature of the past twenty years.

CONCLUSION

In this chapter I have outlined how the Epipalaeolithic sequence of the southern Levant has been constructed under the aegis of a broad social evolutionary framework. This social evolutionary meta-narrative presumes a late Pleistocene progression from simple foraging to complex collecting and the latter is seen to form a necessary precondition, or threshold, groups had to surpass in order to develop agriculture. The study of this process is nested within a geographical dichotomy that considers the Mediterranean zone of the southern Levant as a favourable environmental core region in contrast to the semi-arid and arid periphery, which is seen as marginal both ecologically and culturally. Climate change is considered to be the primary motor of socio-cultural change bearing direct influence on local adaptive behaviour, as well as fostering population movements in and out of expanding or contracting phyto-geographical zones. This narrative, although persuasive in certain aspects, lacks a fundamental appreciation or acknowledgement of human agency. Change is induced from external sources and social structures are governed by the primordial forces of adaptation and survival. The actions of individuals and collectives, as well as their possible understandings and conceptualisations of the world in which they lived, bear no relevance and matter little in this constructed narrative. The key issue here is the inherent tautology of the argument: social evolutionary principles provide the *a priori* starting point for considering late Pleistocene human groups in the region, offer methodological principles with which to understand and order archaeological phenomena, and present a readily available explanation for understanding them.

The critique which I have presented in this chapter is twofold. Available literature on the Epipalaeolithic Neolithic transition in the southern Levant provides ample evidence that the social evolutionary narrative is not the only possible explanation for the socio-cultural transformations. Early and middle Epipalaeolithic communities cannot be straightforwardly placed into the typological boxes and typologies supplied by social evolutionary categorisations. Similarly, various scholars have provided alternative perspectives on the nature of late Epipalaeolithic (Natufian) sedentism and social complexity. The Pre Pottery Neolithic A is also undergoing a process of rapid reconsideration with new evidence suggesting that these communities do not represent the revolutionary arrival of agriculture on the stage of world history, as had once been thought. Explanations deriving from the perspective of social archaeology have recently gained importance and are providing valuable insights into our understanding of the Epipalaeolithic to Neolithic transition (Cauvin 1994, 2000; Hodder 1990, 2007; Watkins 2004a; Watkins 2004b, 2005a, b). Furthermore, I argue that currently available palaeoenvironmental datasets for the southern Levant are too coarse-grained and poorly correlated with archaeological data to infer climate as the primary and only factor in causing the socio-cultural transformations of the late Pleistocene. To-date, we have an incomplete understanding of the effects global climatic events had on local environs and how they relate to the archaeological record. Further problems are highlighted in the way cultural historical principles are being employed to reconstruct cultural continuities, population movements and cultural contacts between groups, by solely relying on chipped stone typologies and selected technological criteria.

However, the fundamental interpretive problem raised here lies in the concept of social evolution itself and how it relates to understanding landscapes. The dichotomy between nature and culture has cultivated a perception of hunter-gatherer landscapes as natural, dominated by economic and ecological forces. Within such empty, rationalised spaces hunter-gatherers do not *act*, they merely *react,* to external stimuli. This understanding of landscapes is problematic, in large part because the division between nature and culture has been exposed as a modern construct. The treatment of hunter-gatherers as passive and naturalistic, and the understanding of landscape as a physical, ecological and environmental backdrop to human existence are two sides of the same coin. Both serve to back up the modernist meta-narrative of progressivist social evolution by applying rationalising principles cross-culturally beyond all contexts. If we accept that this post-modernist critique bears direct relevance to the study of Epipalaeolithic communities and landscapes, then we are forced to rethink the ontological assumptions we use to study these groups. In a nutshell, seeing landscapes as commodified spaces void of social agency, and hunter-gatherers as passive agents within these landscapes, reflects modern parameters projected into the past. Whether these serve to reconstruct the past in light of our own perception of ourselves or not (Shanks 1987a, b), we need to critically rethink whether such perspectives are applicable to past human societies and whether their construction of landscapes were fundamentally different from our own. To arrive at a more holistic understanding of the social agents and landscapes that may have once existed in the Epipalaeolithic of the southern Levant it will be necessary to rethink the concept of landscape in our study of late Pleistocene groups.

Chapter 3: Revisiting Barbizon: Landscape and Agency

INTRODUCTION

For many years landscape has been a recognised buzz word in archaeology and related disciplines such as historical and cultural geography, and social anthropology. Reflecting differences in epistemology, landscape is now approached from a variety of angles, some of which are not necessarily complementary with one another. Both field-work based and environmental approaches, as well as perspectives strongly orientated toward social theory have been developed and tested. In the previous chapter I have argued that the concept of landscape in the study of late Pleistocene communities in the southern Levant has remained largely inexplicit and under-theorised. I now want to review and define the scope of hunter-gatherer landscape archaeology in the southern Levant and develop how the making of the late Pleistocene landscape can be studied. On a more epistemological level, my focus remains on the relationship between agents and structures, which I seek to contextualise in the question of how landscapes are socially constructed and *made* through practice. This is, as outlined in chapter 2, concerned with how communities construct social spaces as vehicles for developing social identities, structures and practices, and how these constructions feed into long-term patterns of social continuity and change, and act mnemonically and structurally on individuals and groups. This conceptualization runs counter to the static and positivist understanding of space outlined previously, which characterizes the social evolutionary meta-narrative that underlies the construction of prehistory in Southwest Asia. An engagement with these themes can be accomplished by considering archaeological landscapes as a nexus in which the process of structuration is played out and engrained with the structural properties people draw on to negotiate identities, roles and social relations. They can be usefully studied as part of *archaeology of inhabitation*. For this purpose, it will be necessary to discuss the development of landscape archaeology in some detail, since the primary inspiration for the approach adopted here were outlined as part of the development of landscape archaeology.

AGENCY AND LANDSCAPE: DEFINING THE ISSUE

The concept of landscape encompasses a wide variety of meanings, and is used in manifold ways by different scholars. Geographers, archaeologists, historians, anthropologists, environmentalists and practioneers in other disciplines all use landscape to describe a wide ranging array of concepts, entities and perspectives. It could be said that what they all have in common is that the scope of their enquiries is not restricted to a very specific, singular locale in time and space, but relates to a more holistic, wide ranging and largely fluid conceptualisation of place, being and temporality. In 'British landscape archaeology' (Brück 2005), landscape has come to be seen as a nexus where both the physicality and sociality of space converge. Yet, as Gosden and Head (1994: 113) have pointed out, landscape remains a usefully ambiguous concept. The fact that through this ambiguity landscape can serve as a talking point about physical, abstract space and social action makes it a highly useful and widely applicable concept. Although Landscape Archaeology has also been a concern in other parts of the world the meaning of landscape in such contexts often stands for archaeological methods employing survey and palaeolandscape reconstruction, but do not necessarily encompass a theoretical perspective on what *landscape* as a concept means.

The origins of Landscape Archaeology can be identified in British archaeology of the mid-1970s. It stemmed from the combination of field archaeology, championed by Crawford (Crawford 1953) and historical landscape studies, as put forward by Hoskins (Hoskins 1955). These two lines of interest were first collated by Fowler (see papers in Fowler 1972), and later combined in Ashton and Rowley's *Landscape Archaeology* (Ashton & Rowley 1974). In these approaches landscape was largely seen from the perspective of off-site archaeological techniques (including aerial photography, geophysics, field walking, mapping and small scale excavation), which could be employed to study medieval field systems or prehistoric monuments. Surface visibility of artefacts or sites was a primary element used to assess the archaeological evidence and primarily defined the landscape as what was visible on the ground today. With the development of behavioural and processual approaches to understand the archaeological record, landscape archaeology came to rely heavily on ideas drawn from the New Geography (Cosgrove 1984) movement and used various types of landscape modelling to infer economic organisation and environmental parameters to situate past behaviour. Colin Renfrew's (Renfrew 1979) study of megalithic monuments on Orkney using polygons to reconstruct past territories of social groups and the concept of site catchment analysis (Vita-Finzi & Higgs 1970) are examples of processual studies of landscape. Hodder and Orton's

(Hodder & Orton 1976) consideration of the spatial distribution of archaeological sites is a further example of how landscapes were perceived by archaeologists up to the late 1970s.

With the beginning of the 1980s, changes across the social sciences, commonly referred to as the interpretative turn, began to affect the idea of landscape in archaeology. This was largely based on a rejection of generalised, cross-cultural frameworks used to explain the past (Hodder 1982b, c, 1986; Shanks & Tilley 1987a, b) and drew on parallel developments in human geography. Here, Denis Cosgrove (Cosgrove 1984) sought to critique the abstract and overtly scientific depiction of space in geographical studies. Through a historiographical critique of maps Cosgrove (1984) argued that maps represent a particularly modern, Western way of objectifying space, time and people. He traced this modern gaze back to the Enlightenment and argued that mapping space was closely associated with the Cartesian rationalist desire to measure and tame the world from a state of natural chaos toward cultured order. In this process, space became void of social action and meaning, creating a representation which was selective by excluding other conceptualisations and interpretations of space and time. The making of maps was therefore seen as an instrument of power and control. These ideas were quickly taken up by archaeologists who, out of disciplinary habit, also frequently dealt with maps, space and landscapes (Bender 1993a, b, 1999; Thomas 1993) Developments in anthropology were also crucial since they, too, began to question the interpretation of landscape as abstract and inert space. Drawing inspiration from ethnographic fieldwork social anthropologists pointed out that non-western societies developed very different understandings of nature, environment and landscape, which contrasted starkly with Western notions of space (Bird-David 1990, 1992a, b; Casey 1993; Ingold 1993, 1996, 1998, 2000; Layton & Ucko 1999; Thomas 1996, 2001, 2008; Tilley 1994). Numerous studies showed how in some societies landscapes were perceived as alive with the spirits of the ancestors and other transcendental beings. Filling the landscape with meaning in such a way encapsulated social relationships between people, space and time. Since archaeologists, especially prehistoric archaeologists, were primarily concerned with pre-modern, non-Western societies, these studies had an immediate bearing on archaeological conceptualisations of landscape. Archaeologists therefore soon called for a critique of the way in which landscape was treated as inert, abstract space, populated not by people and their social worlds, but by pots and sites plotted on distribution maps (Barrett 1988, 1994, 1999; Bender 1993b; Chadwick 2004a; Layton & Ucko 1999; Thomas 2001, 2008; Tilley 1994). They objected to the view that landscape represented primarily a geographical, spatially abstract entity filled with variable types of resources strewn across physical space, creating obstructions and hindrances for people that had to be overcome. The latter view of landscape was seen as commodification of landscape, associated with modern capitalism, of which the distribution map was but one expression (Bender 1999).

The emphasis on social aspects of landscapes reflects a concern with recognising humans as knowledgeable agents, which became a central issue in much of interpretative archaeology generally. Practice and agency theory provide an entry point for archaeologists to consider how meaning may have been produced in the past as part of the ongoing engagement of people with one another within social institutions and norms. In terms of understanding landscapes and how they were incorporated in this production of meaning, archaeologists focussed on phenomenological approaches to understand how landscapes may have been perceived. It was argued, drawing on the work of Heidegger (Heidegger 1962; Heidegger 1982) and Merleau-Ponty (Merleau-Ponty 1962) that states of *being-in-the-world* should become a focus by studying how archaeological landscapes may have acted as a referent in the negotiation of meaning between the individual and the physical world. Chris Tilley (1994) used a phenomenological approach to understand how Neolithic landscapes in South Wales may have been perceived and rendered meaningful by agents in the past. In anthropology, Tim Ingold's (Ingold 1993, 1996, 1998, 2000), research focussed on developing a similar anthropology of perception, in which he marries phenomenological approaches to space with an ecological phenomenology. In archaeology, many studies have been heavily influenced by phenomenological perspectives, especially those dealing with Neolithic and Bronze Age ceremonial monuments (Cummings 2002a, b; Cummings et al. 2002; Cummings & Whittle 2003; Edmonds 1999). However, phenomenology is by no means the only landscape-based perspective taken up by archaeologists. Bender (Bender 1993a, b), for example, approaches the subject from the perspective of (modern) relationships of power and control over space and place. Many others, while also interested in putting people back into the landscape (Fleming 1999, 2006), did, however, not follow the explicit phenomenological path.

Rather than embracing phenomenology on the basis of trying to understand the meaning of past landscapes, archaeologies of inhabitation have focussed on how perceptions of landscapes underlie the formation of social identities. John Barrett (Barrett 1989, 1994, 1999) is the most noted proponent of this branch of landscape archaeology, although others draw on similar concepts (Chadwick 2004a; Chadwick 2004b; Edmonds 1999; Edmonds & Seaborne 2001; Pollard 2000). Although these studies share some common ground with explicit phenomenological studies, their focus is on routine practices, such as technological engagements situated in time and space, as well as regular movements through the landscape. These authors suggest that through material engagements individual and collective identities are created by socializing human agents as part of routine practices. Especially important are aspects of human action which relate to the *habitus* of a group of people and how this constitutes dwelling in the world. They are strongly influenced by Tim Ingold's (Ingold 2000) work, especially in relation to the concept of taskscape. Barrett especially (Barrett 1989, 1994, 1999; Barrett 2001) emphasises the importance of landscape as constituting a field in which the process of structuration takes place. This provides a strong link with agency and practice theory, as it was developed by Bourdieu (Bourdieu 1977, 1990) and Giddens (Giddens 1979, 1984). This focus on routine practices as part of a negotiation of meaning between social structure and individual agent creates links and relations between people embedded in social relations and situated in time and space. These are situated in meaningful social worlds where the traditions bound up with particular locations provide people with the cultural resources and practical knowledge to act effectively (Brück 2005: 62). Other approaches of a similar vain can be found in Richard Bradley's (Bradley 1998, 2000) work, where he argues that the assignment of meaning to particular locales constitutes an important element of people's engagement with these landscapes.

Although phenomenology has been widely advocated in Landscape Archaeology, it has not been uncritically accepted by everyone and the concept of archaeologies of inhabitation, do somewhat contrast with the hyper-interpretative style adopted by some phenomenologists (Brück 2005; Fleming 1999, 2006). There are two related lines of critique that have been levelled at highly interpretative Landscape Archaeology generally (which includes both phenomenological perspectives, as well as archaeologies of inhabitation). The first is that phenomenological approaches to landscape lack methodological rigour in linking theory with practice. The second is in how far landscape can be considered an all-encompassing, cross-cultural phenomenon, which is applicable even in cases in which we cannot be sure whether such a concept existed or was of any relevance to past people. The latter is particularly crucial when it comes to the study of prehistoric societies. Phenomenology is intimately related to existentialist and anti-foundationalist philosophies (Heidegger 1962; Heidegger 1982; Husserl 1975, 1982, 1984, 1989) that are not necessarily accepted by all branches of philosophy (Adorno 1973; Marcuse 1956; Marcuse 1964). Enquiries into the historiography of landscape, on the other hand, have revealed that its roots are closely linked with romanticist ideals (Johnson 2006a, b; Lemaire 1997). Some have accused phenomenological approaches to Landscape Archaeology of constructing too rosy and romantic an image of past cultural landscapes (Brück 2005; Fleming 1999, 2006; Johnson 2006a, b).

Many consider Christopher Tilley's *A Phenomenology of Landscape; places, paths and monuments* (Tilley 1994) as perhaps the most influential work of what has been come to be called "British Landscape Archaeology" (Brück 2005). Tilley' study of Neolithic tombs in Wales draws heavily on phenomenologist philosophy and uses ethnographic case studies to describe instances of non-Western views and perceptions of landscapes; although the majority of these case studies are Australian Aboriginal perceptions of landscape as related to *Dreamtime.* Tilley explores the Neolithic tombs of Wales by walking over and describing routes between monuments, their placement in the landscape, and their relationship with prominent physical features. One of the conclusions from this imaginative study is that some megalithic tombs were constructed in such a way as to mimic natural rock outcrops or hilltops (e.g., Pentre Ifan resembling Carn Ingli in Pembrokeshire). Following this seminal work, many other authors have embarked on similar studies (Cummings 2002a, b, c; Cummings 2003; Edmonds 1999) and Tilley himself has expanded on this work recently (Tilley 2004). Although he found Tilley's idea of phenomenology and landscape compelling, Fleming (Fleming 1999) argued that the evidence in the field did not support all of Tilley s interpretations. He showed that a number of the tombs described by Tilley did not, in fact, point toward any significant landmarks and that the relationship established between some of the tombs by intervisibility and movement between them did not take into account the state of preservation of field monuments. Fleming argued that because Tilley was indifferent to the issue of site preservation some of the patterns of movement and intervisibility were inconsistent. Furthermore, it appears somewhat striking that a majority of the ethnographic inspirations , as Tilley calls them, are taken directly from the particular cultural sphere of Australian Aborigines, a group of people with a very rich mythical and cosmological understanding of landscape based on the origin story of the *Dreamtime.* Tilley makes no attempt to consider other, alternative ethnographic case studies in which landscapes may not have featured as important or central. Therefore, Tilley could be accused of being selective and partial in his selection of ethnographic case studies and their transferral to Neolithic Wales. Other scholars have similarly been critical of the lack of methodological rigour in phenomenological approaches to past cultural landscapes (Brück 2005; Johnson 2006a, b). This is a critique which has been levelled generally at post-processual and interpretative archaeologies (Chippindale 1993; Kohl 1993), although claims that post-processual archaeology is characterised by extreme relativism have been refuted (Lampeter Archaeology Workshop 1997). Yet, it appears that the almost antiquarian exploration of landscape by foot, its representation through photography (often in itself claimed to be an objectifying technique (Shanks & Tilley 1987a, b)) and its exploration through the writing of highly interpretative and imaginable texts is particularly vulnerable to such critiques.

This non-formal and anti-empiricist way of accessing past cultural landscapes has been associated with romanticism by some commentators (Brück 2005; Johnson

2006a, b; Layton 1999; Lemaire 1997). Both romanticism and phenomenology are part of a reaction against Cartesian thought. In its existentialist roots, phenomenology was a reaction against the subject/object dualism and foundationalist philosophy. Romanticism, on the other hand, was the response to the same Cartesian rationality played out in literature and the arts. It sought to create representations and visions of the landscape which were evocative and aesthetic, rather than rationalising nature. Popular examples of such visionary, evocative and non-rational landscapes are the paintings of J.M.W. Turner and John Constable. Other expressions can be found in the creation of landscape parks and gardens, which became fashionable at the turn of the end of the eighteenth and beginning of the nineteenth centuries in England, as exemplified in the works of Lancelot Capability Brown (Hoskins 1955; Muir 2000). The specific criticism brought against some phenomenological approaches to Landscape Archaeology is that they rarely discuss discontent, conflict or animosity in perception or use of the landscape. Social relations of power and conflicting agendas of individuals are rarely discussed (Bender 1993a, b, 1995; Brück 2005; Fleming 2006; Johnson 2006a, b). There is a danger in that the description of landscapes as ritualistic, sacred or cosmological archaeologists disregard the idea that landscapes can also be part of social strategies of domination, resistance and violence. Some landscapes may be threatening and dangerous beyond the cultural connotations associated with them. Critics of the romantic nuances present in phenomenological approaches to landscape have also pointed out in how far romanticism is as much an ideology associated with the modern West as Cartesian thought (Johnson 2006a; Lemaire 1997). Indeed, romanticism as a movement is almost unthinkable without its juxtaposition against Enlightenment rationalism. Thus, in how far is the idea of landscape permissible as a cross-cultural concept, applicable across time and space, while at the same time being used to overcome deterministic frameworks, remains unclear

Furthermore, it is important to be aware that the concept of landscape is something conceived within the context of the relationship between an English gentry's upper class and a rural, tamed British landscape. There is a reason why the creation of parks and landscape paintings was particularly evocative in England, when compared to the continent. Although landscape paintings were created early on in the Barbizon artist's colony in rural France, romantic ideals evoked in literature and gardens in mainland Europe had a far less tangible long-term impact. This is because close connections emerged between the land, romantic notions of landscape and European nationalism in the middle of the nineteenth and early twentieth century that found their expression in cultural-historical and *settlement archaeologies* where material culture, land and race became intimately linked (Kossina 1911; Veit 1984, 2000).

Although phenomenological approaches sought to overcome essentialist conceptualisations of space and landscape, some have argued that by putting the individual and his/her perception at the centre of their epistemology phenomenologists have not overcome the subject/object dichotomy, but have assumed a generalising concept applied across time and space (Brück 2005). The modern observer, e.g., the archaeologist, studying the distribution and placement of megalithic tombs, represents a particularly constituted and situated agent. Can she/he really hope to experience and perceive the modern landscape in the same way as a past observer would have? If this is deemed impossible, the question arises as to the purpose of the exercise? In other words, if we cannot hope to understand past observers' experience of the landscape, why should we attempt to situate ourselves in an approximating position?

More to the point, however, is the critique of phenomenological perspectives that have emerged from gender studies in archaeology, in particular the work drawing on queer theory and the social construction of gender (Burkitt 1999; Butler 1990, 1993; Csordas 1995; Dowson 2000; Entwistle 2000; Foucault 1984; Grosz 1994, 1995; Hamilakis 2002a, b; Hamilakis & Tarlow 2002; Howson & Inglis 2001; Joyce 2004, 2005; Meskell 1999, 2000; Nettleton 1998; Pluciennik 2002a; Scott & Morgan 1993; Shilling 1993; Tarlow 2000, 2002; Thomas 2002; Yates 1993). Some have argued that phenomenological approaches have under-theorized the social construction of the body in order to get at experience. Phenomenologists have assumed a generalised body to be the centre of experience, which is genderless and objectified. This construction ignores the tensions in the social formation and socialisation of human bodies. Phenomenological landscape archaeology is created through the eyes of an often male modern archaeologist, which excludes other, alternative forms of perception and experience. Consequently, some have attempted to rectify this situation by considering children's experience of place and landscape or soundscapes (papers in Gamble 2007; Scarre & Lawson 2006).

It is at this point that the differences between phenomenological approaches and archaeologies of inhabitation crystallise, for the latter does not take the experience of the individual as its primary point of reference. Although individual perception does play an important role in how landscapes are experienced and constructed, archaeologies of inhabitation stress that agents are situated within a contextualised duality of agents and structures. The relationship between the two is mediated by practice and its focus is on relationships between agents, social structures, materiality, animals, plants and so forth. Studying how landscapes may have been experienced in this context is not an attempt to try and gain an understanding of how past landscapes may have been perceived by people, but aims to understand processes of socialisation through experience. Socialisation in this respect is often understood as situated in the processes of learning the norms and conventions of a social group, which constitutes *habitus.* Thus, such studies draw heavily on both practice theory as developed by Bourdieu (Bourdieu 1977, 1990, 1998), as well as Giddens' theory of structuration (Barrett 2000; Barrett 2001; Barrett & Fewster 1999; Gardner 2004, 2007; Giddens 1979, 1984). Importantly, this process of socialisation, the conditions under which *habitus* is constituted, is always situated in time and space. Landscapes are, by definition, spatial in character and, as a concept, worthless without temporality. The focus on relationships between agents, places, materials, animals and so forth has furthermore stimulated an engagement with anthropological and psychological approaches to perception of the environment. Ingold's concept of taskscape (Ingold 2000), in particular, has become of primary importance in archaeology. In developing his idea, Ingold was inspired by the work of J.J. Gibson (1979), who in turn drew on direct realism developed by Thomas Reid (Reid 1806 (1764); Reid 1806 (1785), 1808 (1788)). Before I turn to discuss these aspects in more detail, I would like to briefly return to the concept of *habitus* and agency in archaeology.

Agency has become popular in archaeology since the mid-1980s as a critical component of post-processual and interpretative archaeologies, and recently gained importance in behavioural and evolutionary archaeology (Dobres & Robb 2000; Gardner 2004). In order to develop a landscape perspective and to unravel the plethora of definitions, not all of which correspond well with one another, it is critical to discuss agency and practice theory in detail. This discussion serves as the basis for the heuristic approach outlined in chapter 4. I argue that agency is an intersubjective course of action with the material and social world, following broadly the outline of John Barrett (Barrett 1994, 2000; Barrett 2001; Barrett & Fewster 1999; Dobres & Robb 2000). Furthermore, I suggest that one of the primary means by which archaeologists are able to access these intersubjective relations of agents with the social and material world is through the study of discursive and non-discursive technological skills and practical knowledge (Dobres 2000; Ingold 2000; Pfaffenberger 1992). These instances of discursive and non-discursive practices are located in time and in space, justifying a focus on landscape as the locus in which these actions come to the fore. Residues of such past *taskscapes* (Ingold 2000) are accessible to archaeologists in the form of settlements, lithic scatters, raw material acquisition locations, etc. In addition to a focus on technological skills and knowledge, other practices involving ritual or formalised patterns of practice can also at times be recognised (Barrett 1989, 1994, 1999).

Agency and practice have to some degree become overused terms in archaeological interpretation. It is often frustrating to find references to agency which barely pay lip service to the concepts first formulated by Bourdieu (Bourdieu 1977, 1990, 1998) and Giddens (Gardner 2004; Giddens 1979, 1984), and often fail to comprehend the dualist nature of the idea of *habitus* or structuration. All too often agency is understood as a proxy for the individual's intentionality or free will (Dobres & Robb 2000; Gardner 2004, 2007; Johnson 2004; Johnson 2006b). Yet, none of these equations bear much relevance to the way in which the concept was originally conceived. Agency and practice theories emerged as part of a broad, gradual process of trying to overcome the Cartesian dualism between social structure and the individual. The juxtaposition of social structures and individuals has been primary focus of sociology since its conception as an independent discipline (Noble 2000). Sociologists differed in opinion with regards to whether social structures dominated individual action, or vice versa. Scholars arguing for the latter often empathetically emphasised that humans had free will and were able to make decisions independent of social structures, however difficult they might be to escape. The dichotomy between structure and individual reflected the Cartesian philosophy drawing a distinction between the mind and the outside world and how this outside world is perceived and understood by humans. It is fair to say that a majority of sociologists accredited social structures as being a determining factor over human action.

With the general challenge to modernity voiced by many philosophers throughout the twentieth century (Baudrillard 1990, 1994 (1981), 1994 (1992); Heidegger 1962; Heidegger 1982; Wittgenstein 1997, 2001), sociologists soon began to rethink the role of social structures and their relationship to social action (Adorno 1973; Bourdieu 1977, 1990; Derrida 1976, 1978; Descola 1996; Foucault 1967, 1970, 1972, 1979, 1984; Giddens 1979, 1984; Marcuse 1956; Marcuse 1964; Merleau-Ponty 1962; Noble 2000). Building on the structuralist concepts (de Saussure 1977 (1916); Levi-Strauss 1958, 1976) of linguists, anthropologists began to question the deterministic nature of social structures in the process of negotiating meaning (Hodder 1982c, 1986; Shanks & Tilley 1987b). Rather than assuming that meaning is assigned to objects and concepts by people and is to some degree inherent in them, a focus on the role of practice emerged. The imbuement of something with meaning was now seen to take place as part of a process which consists of fluid, not fixed, signs. This negotiation of meaning was considered to take place *in action* rather than as predetermined by either grammar or mental template. Such post-structuralist considerations in linguistics soon inspired sociologists to rethink the relationship between social structure and individual agent. Rather than to see social action as either determined by social structure or the free will of the individual agent, the social meaning was instead seen to arise from an interdependent process of negotiation between social structure and individual agents. .

Both Bourdieu and Giddens converge on this issue from slightly distinct perspectives. In order to understand how domination and social reproduction occurred in societies Bourdieu (Bourdieu 1977, 1990, 1998) called for an explicit consideration of bodily know-how and skilled competence in the generation of social realities. He disagreed with positions that understood agents as rationalising and purely economic agents. As such, he opposed attempts to understand societies as divided into social classes or economic units, as both Marxism and capitalism had done, but stressed the importance of educational and social milieus. He termed these milieus 'social fields', which consisted of a system of social relationships dependant on power. In his view a social field is an arena in which agents struggle to gain different types of social capital. Capital can consist of anything that the agent desires to obtain, such as money, status, etc. Fields can be defined on the basis of the relational differences between social agents and is delineated by where its effects terminate. Fields can co-exist and be closely interrelated, but do not necessarily have to correspond to social class, ethnic group or other normative types of social groupings. Bourdieu argued that each field has an internal logic or set of rules, which shape the practices and experiences within it, which he called *nomos.* Agents who enter a social field inexplicitly accept the underlying rules and the logic of the field by engaging in practice. The counterpart to the social field in Bourdieu's theory is *habitus*, a term which he appropriated from Marcel Mauss (Mauss 1992). He defined it as a system of dispositions, both simultaneously mental and bodily, which exist subconsciously and have been acquired by humans as part of a process of socialisation. The habitus includes more classic Maussian concepts such as gestures and skills, but also modes of thought and perception. These dispositions occur as a response to an agent's encounter to objective conditions. Thus, objective social fields become internalised, subjective experiences of social reality. Bourdieu termed this internalisation of social fields into '*habitus* doxic', and argued that its constitution consisted of the interdependent relationship between them brought into existence by practice. Thereby, doxa becomes the largely unconscious, fundamental beliefs, and universal truths accepted as common sense that shape an agent's actions and practices. Although Bourdieu emphasised the importance of practice and the mutual constitution of both field and habitus, doxa tend to be structured according to the social field. This represents Bourdieu's continued commitment to Levi Strauss's structuralism, where social structures appear as somewhat dogmatic entities. Bourdieu's approach attempts to converge both structuralist and phenomenological approaches to the study and understanding of social realities, and represents an attempt to overcome the subject/object dichotomy.

Anthony Giddens conceptualisation of agency and social structure centres on the theory of structuration (Giddens 1979, 1984). Like Bourdieu, Giddens argues that social structures and agency are interdependent and necessitate each other in their reproduction. He argues that social structures cannot exist without a social agent reinforcing it through action, but at the same time an agent cannot act without drawing on social structure. Even action to change social structures has to draw on pre-existing social structures and to a certain extent even the very structure the agent seeks to overcome. Giddens argues that in order to understand how social realities are produced, reproduced and changed, sociologists have to study both structure and individual action in order to understand the relationship between both. For Giddens, social structures consist of rules and resources that involve human action. Here, rules are seen to limit social action, while resources enable different forms of action to become possible. A central element in Giddens' theory is the concept of knowledgeability, which differentiates it from Bourdieu's *habitus*. For Bourdieu, the majority of people's habitual engagement with social fields is sub-conscious and implicit. Giddens' concept of knowledgeability, however, accredits agents with greater potential of knowing the world and the social reality in which they exist. Although he acknowledges that agents do not possess all-encompassing knowledge, he argues that they are nevertheless intimately aware of the conditions that constitute their social realities. Social realities arise within systems, although Giddens describes these as being very different from the way in which social systems have been seen conventionally. He argues that "to examine the structuration of a social system is to examine the modes whereby that system, through the application of generative rules and resources is produced and reproduced in social interaction" (Giddens 1976:353). Thus, he understands systems as the point at which the negotiation between social structure and agent is situated. The relationship between structure and agent is considered as contextual and independent of temporality; a point some have criticized (Barrett & Fewster 1999). Others have been more generally critical of Giddens ontology in a wider sense (Archer 1995, 1996, 2000; Mouzelis 1995; Parker 2000). A variety of these archaeological critiques have been recently discussed by Gardner (Gardner 2007). Crucial for Giddens understanding of agency, is that although social structures can constrain action that they should be primarily considered as *enabling* action, even if action re-creates the structure in the same or a very similar manner. To put it in slightly more direct terms, people make use of the norms and values existing in their culture or social group, which they have been taught and gained experience in as part of processes of socialisation. These norms and values, or rules, are employed together with material resources in social interactions. These rules and resources are not determining practice, but are assets for social action, although the actor's knowledge or understanding of them is not necessarily all-encompassing. The outcome of action is therefore never totally predictable.

The essence of both Bourdieu's and Giddens's theories, in my view, is that deterministic approaches are problematic since they do not adequately account for how social structures or social fields are continuously reproduced or changed. In other words, Giddens and Bourdieu allow us to look at both structures and individuals, giving equal importance to both in the process of creating social realities and meaning. Similar to many branches of sociology, anthropology or history, archaeology has tended to place emphasis on social structures in their search for the origins and reasons behind social change. Some archaeological perspectives have furthermore tended to be deterministic with regards to social structures and for example environmental pressures. Agency or practice theory, in contrast, allows us to take account of how action is generated as part of a generative, interdependent process, while not succumbing to individualism, which can rarely be adequately addressed on the basis of the archaeological record (contra Hodder 2000).

Archaeologists who have employed agency theory have done so from varying perspectives. Some of the most successful work in this regard has been undertaken by John Barrett (Barrett 1994) who has described Late Neolithic and Bronze Age monumental landscapes in southern England and how they relate to structuration, action and agency in a stimulating narrative. But, archaeologists have not been united over the concept of agency and many have neglected to acknowledge that Bourdieu's and Giddens's ideas operate as part of a duality between object and subject. Hodder (Hodder 2000), for example, has maintained that agency should be primarily about individuals, rather than social structures an understanding which has been replicated, albeit unconsciously, by many others. Others have been critical of what they have perceived as a masculine focus in agency theory (Gero 2000). Gero has argued that the focus on action in agency reflects male perspectives on practice and, as such, does not take into account female roles in the past. However, it can be argued that yet again this represents a misconception of agency, since both action and inactivity are both constitutive of agency (non-action in certain instances can be understood to be a deliberate act to not engage in the reproduction of a social structure and may , indeed, also reproduce norms and values). Yet, the relationship between gender and agency is an important one to which I will return later on. Differences in the agreement over what agency is in archaeology reflect, on the one hand a partial or selective reading of the primary literature, to reinforce polemic debates between *interpretative* and non interpretative archaeologies.

Recently, a number of scholars have begun to further develop the notion of agency toward including not only people as active ingredients in the process of structuration, but to also accredit agency to things, animals, plants, landscapes and places (Gosden 2005; Gosden & Marshall 1999; Thomas 2002, 2004). These works draw on Alfred Gell's (Gell 1998; Gell & Hirsch 1999) ethnographic work amongst Polynesian groups where some objects are imbued with agency. Such forms of animism have been considered as a useful challenge to Western concepts of objects as inert and it has been argued that in order to fully overcome the subject/object divide, we must also consider the properties of objects that effect people, which cannot always be controlled. Such concepts of agency also cite Latour's (Latour 1991, 1996) work on actor network theory in which he studied the way in which objects in scientific laboratories shape the set-up of experiments and the framing of knowledge as part of an interactive process. Latour termed objects 'actants' and considered them as being equal constituents in the social web of agentive interaction (Gosden 2005; Gosden & Marshall 1999; Knappett 2002; Knappett 2005; Knappett 2007; Robb 2004; Webmoor & Witmore 2008). Gell's ideas can be traced back to pragmatist philosophy and semiotics, as it has been put forward by Charles Peirce (Peirce 1992, 1998; Preucel 2006). This is a perspective which has gained much further attention in archaeology recently. Although animism and totemism are well-known anthropological phenomena, it is, in my view, problematic to assign agency to objects in the same way as agency is assigned to people. It is understandable that in its drive to become ever more counter or anti-modernist, archaeology seeks to break down the distinction between the individual, a modernist concept as some would argue, and the object world (Thomas 2002, 2004) and, thereby, accredit agency to objects. Yet, consideration of objects as having effects on people and limiting human action in terms of technological potentials of an object is not especially new in archaeology, but is a long recognised issue. Furthermore, it appears that some practice a somewhat uncritical transferral of concepts from distinct socio-cultural contexts, i.e., Polynesian society, to interpret material culture in archaeological contexts (Layton 2003). Totenism and object agency thereby become somewhat totalising concepts, which appear applicable in every time and place. This disregards the cultural specificity in which objects have been imbued with agency, such as Polynesia. This application requires much more careful attention to the process of analogy-making than that displayed so far by its advocates in archaeology. Although objects can clearly obstruct and frustrate human action, it does not follow that they do so on their own incentive. This may be possible in situations were objects are cosmologically considered to be powerful or imbued by a spirit, but the existence of such a relationship has to be demonstrated at first before such effects can be assumed to have existed. What is crucial here is the level of *participation* in practice. It can be argued that objects cannot participate in practice, because objects are not capable of mutual recognition of other actors (Wenger 1998: 56). Engaging in practice necessarily entails the production of meaning and as such it also entails the production of identity. What, how, where, when and why we engage in practice shapes how people define themselves in relation to others; this process in inconceivable without mutual recognition. While we may say that agency can inhibit or enable human action, and could thus be said to have some form of agency, would we be comfortable in claiming that they also produce an identity of their own? Since objects are not self-aware and therefore cannot engage in mutual recognition, they have no agency in the same way as people do. Objects have capacities and affordances, which represent nothing but elements of resources that do not necessarily constrain human action, but also enable human action (Ingold 2007). Furthermore, it is essential to not abandon the duality of structure by attributing agency to objects. This duality is a key component of agency theory and consists of two poles: the individual *and* the social structure. While they are juxtaposed to complement each other and engage interdependently in the creation of meaning and social action, resolving this duality also resolves the concept of agency. This is what Actor-Network Theory (ANT) effectively does by considering social action to be situated in a web of actors, actants and social structures (Latour 1991, 1996). For these reasons, I am cautious with regards to object agency, although I would agree that certain objects may be imbued with *activeness* if human actors attribute it to them; however, I would argue that this relationship needs to be actually demonstrated, rather than *a priori* assumed, in archaeological contexts. Otherwise object agency comes dangerously close to being a cross-cultural concept.

This brief excursion into the issue of object agency also poses the question in how far structuration theory and agency approaches in general are in danger of being universalized and un-contextual frameworks, which may have little to do with peoples past understanding of self (Gero 2000). Furthermore, it is questionable whether post-modern approaches that advocate a total discursiveness and reflexivity do not render the study of the past, or indeed any kind of social or historical science, impossible. Where is the boundary between nihilism and relativism on the one hand and determinism and empiricism on the other? Critics of post-modern thought, largely coming from Marxist perspectives, have suggested that the deconstruction of the self since the interpretative turn makes any thinking about historical progress difficult (Eagleton 2003; Harvey 1989, 2001). These and other critics question whether it really can be claimed that history is not characterised by some kind of progress at all and whether the individual can ever be totally deconstructed. Feminist and gender theorists have, on the other hand, pointed out that agents in many practice or agency theories are essentially *genderless* and have therein identified a male-orientated position (Gero 2000). Drawing on the metaphor of this apparent emptiness Gero (2000: 37-38) has questioned whether we confront a concept that is put into service to reduce the infinitely diverse ways in which humans take action and interact with structure to a uni-dimensional mode, one that flattens motivation and sensibility, omits cognition and meaning, and ignores sensory experience. Giddens's theory has been remarkably resilient toward such critiques; since they do not appear to challenge the fundamental (and paradoxical) duality between structure and agency he and Bourdieu (albeit in a different way) have described (Gardner 2007). This duality needs both the individual and social structure to operate, thus, neither can be fully resolved. This counters criticism directed at relativism and postmodernism, especially because Giddens himself rejects this label (Giddens 1991). Feminist critique of the totalizing nature of agency and the argument that agency is always *gendered*, equally fails to fully capture the persuasiveness of the duality of structure. Clearly, humans are always gendered beings and it can be argued that therefore all social action is also gendered. However, as queer theorists have pointed out, gender is *performed* (Butler 1990, 1993, 1997), fluid, and dependent on a process of social structuration. Yet, in the creation of identities and meaning that structuration consists of gender is by no means the only crystallization of different forms of identity. Agency can play a part in creating a wide spectrum of identities, which may be purely or partially gendered, but do not necessarily have to be primarily to do with gender. In this sense then, I would argue that agency theory can be accepted as somewhat of a universal ontology, since its inherent reflexivity permits contextuality.

In its drive to overcome the subject/object divide agency theory generally falls within the remit of post-modern critiques of the nature/culture dichotomy, which I will briefly describe to contextualise it with the study of past landscapes. As briefly described in chapter 2, the nature/culture dichotomy can be seen as a directly related to Cartesian rationalism, which suggests an 'inner' and 'outer' world accessible to humans. This Cartesian thought is the basis of the subject/object divide and has had direct influence on the development of empiricism and rationalist philosophies. As part of the aforementioned anti-foundationalist and existentialist philosophy, the subject/object divide, and with it the nature/culture dichotomy has been criticised as not adequately reflecting the way in which humans dwell in the world. Heidegger's (Heidegger 1962, 1982) phenomenological approach has been crucial in trying to break down such dichotomies and gaining a better understanding of human *being-in-the-world*. As we have seen, such considerations have been central to the study and understanding of landscape in geography, anthropology and archaeology, and they are strongly related to the emergence of practice theories. Since both practice theory and phenomenological approaches aim to mend the distinction between object and subject in modernity, they have strong parallels. Their difference lies in trying to elucidate the relationship between nature and culture on the one hand, and social structure and agent on the other. According to critics of the modernist concept of nature, both culture and nature have been juxtaposed as opposites in the Cartesian discourse on rationality. Yet, such a conceptualisation, they argue, is ideological and specific to the emergence of capitalist, rational and modern Western society (Glacken 1967;

Gosden 1994; Schutz 1967 [1932]; Thomas 2004). Landscapes have generally been understood as natural entities, which are dominated by the physicality of the land, the resources within it and other such hard, external facts (Bender 1993a, b, 1998, 1999; Cosgrove 1984; Gosden 1994; Gosden & Head 1994; Ingold 1993, 1998, 2000; Layton & Ucko 1999; Thomas 1991, 2001, 2008). Abandoning the nature/culture dichotomy involves an understanding and conceptualisation of landscape as a stage of performance and practice in which agency comes to the fore in the process of structuration (Barrett 1988, 1989, 1994, 1999).

To account for the process in which human social relations are situated vis-a-vis the physical environment, anthropologists and archaeologists have increasingly drawn on the concept of dwelling (Barrett 1999a; Brück 2005; Fowler 2003; Ingold 1993, 1998, 2000b; McFadyen 2006; McFayden 2008; Thomas 2008). Central to a dwelling perspective is the idea that any organism is fully immersed in an environment or life world making it an inescapable condition of existence (Ingold 2000: 153):

> "From this perspective, the world continually comes into being around the inhabitant, and its manifold constituents take on significance through their incorporation into a regular pattern of life activity."

Dwelling suggests then that meaning in the world arises as part of an ongoing process situated in the interaction between people, the land, animals, objects and plants, and is contained in the activities taking place in time and space. This concept is clearly very similar and influenced by both practice and agency theories, but also relates back to Heidegger's concept of *being-in-the-world* (Gosden 1994; Heidegger 1962, 1982; Ingold 2000). Ingold's use of the dwelling perspective is heavily influenced by Gibson (Gibson 1979), who developed the concept as part of a reformulation of ecology. He argues that all living things are equally constituted within the environment and suggests that by living in that environment organisms continuously unfold in relation and interdependently to one another. In Gibson's view dwelling is based on perception and is an active and exploratory process. It involves continual movement, adjustment, and reorientation of the receptor organs themselves (Ingold 2000: 166). This consideration leads to the conclusion that if perception is action, then what is perceived is functionally related to how we act. Establishing this connection between perception and action means that knowledge has a foundation in pragmatics, i.e., perceiving an environment means to understand and know what can and cannot be achieved or done within it. It is here that an influence of pragmatism as developed by Reid and Peirce appear to have influenced Gibson's thought (Gibson 1979). Drawing on Gibson, Ingold argues that to perceive an object or event is to perceive what it affords (Ingold 2000: 166). Thus, to perceive the practical qualities of objects as knowledge means that agents understand the affordances of an object. This accredits agents with knowledgeability that is not determined by the environment, but situated within a web of relations. Perception therefore crystallises the concept of knowledgeability. Affordance therefore relates to the physical properties of objects and the knowledge of what can and cannot be done with them. This knowledge arises as part of an interaction between the agents and objects situated in time and space.

Affordances, effects and structuration are useful concepts on which to base an empirical, heuristically grounded study of landscapes and social interaction. In my perspective they reiterate that an archaeological study based on the concept of agency is not concerned, as has been falsely claimed and advocated, with the study of individuals as such (Dobres & Robb 2000; Dobres & Robb 2005; Gardner 2004, 2007; Johnson 2004; Johnson 2006b). Instead, these are starting points from which to consider the relationships between people, social structures, and physical properties of the land, materials, animals, plants, climate, etc., which come to the fore *in practice*. It is through the relationships between these concepts that emerge through practice that social spaces are constructed (Casey 1993, 2008; McFadyen 2006; McFayden 2008; van Dyke 2008). Studying practice is not a hopeless endeavour in archaeology, indeed, we deal with the outcomes of human practices constantly in our encounter with archaeological materials in the present (Barrett 2001). To achieve a heuristically and empirically viable archaeology, though, it is important to recognise that some aspects of our conceptual understanding of the past in the present have to assume certain fundamental and general ontological and epistemological principles. Here, I argue that agency, the process of structuration, the effects and affordances of objects and the concept of landscape, despite all the issues and problems outlined in this chapter, can be employed to move beyond deterministic, narrowly behavioural and modernist constructions of the past. We must be aware of the dichotomies that Cartesian thought has imposed on discourse in modernity and we have to attempt to move beyond the meanings imposed by our understanding of the world. Life in the past was surely socially and culturally very different from the life of the archaeologist in the here and now. Agency means to acknowledge that humans are creative, knowledgeable and versatile beings, who are often, but not always or necessarily, constrained by the conditions of the social environment in which they were brought up or exist. These are actually very simple and straightforward parameters to translate into empirical tools to try and understand how final Pleistocene landscapes in the southern Levant were not only actively made by humans, but how those landscapes formed the nexus in which people engaged socially and how human life unfolded as a process situated in them.

CONCLUSIONS

In the present chapter, I have reviewed current conceptualisations of landscape and agency in archaeology. Although I have acknowledged that phenomenological approaches have a valid and important contribution to make to our understanding of the past, I have noted problems and issues with the way in which reasoning takes place within some of the versions of hyper interpretative archaeologies. Furthermore, I have attempted to review perspectives arising from philosophy of technology studies and anthropological work that have begun to consider object agency as a means to try and better understand the relational aspects of humans and the material world. Despite claims of such approaches to try and move beyond the subject/ object divide, I feel that such approaches have begun to actively erode the concept of agency as a useful heuristic epistemology. While objects clearly have properties that can shape and effect human experience, and are considered active in some social and cultural contexts, I argue that objects are unable to participate actively in practice since they are incapable of recognising other constituents in subject/object relationships. Therefore, agency is a property that remains definitive of human actors. Clearly, animals and plants are also alive, and objects do also undergo changes and alterations. Yet, neither plants, animals nor objects can be understood to be capable of participating in social interaction in the same way that humans do. I have touched upon the concepts of affordances and dwelling in the final sections of this chapter, which are grounded in both Bourdieu's practice theory as well as Gibson's phenomenological understanding of ecology. These ideas are useful and important concepts, which I hope to translate into a heuristically and empirically viable methodology in the following chapter.

Chapter 4: From Theory of Practice to Practice of Landscape: Analytical and Methodological Considerations

INTRODUCTION

How do we study hunter-gatherer landscapes and what are the concepts and issues of relevance in the attempt to elucidate how final Pleistocene groups actively engaged in the making of social and cultural landscapes? Here, I would like to first outline what aspects of landscapes we might draw on to reconstruct past patterns, structures and agencies to enable an understanding of how landscapes were actively constructed by people. Then, I will move on to discuss a series of heuristic methods and concepts through which these issues will be explored on the basis of the evidence obtained through fieldwork at Ayn Qasiyya and AWS 48. Underwriting this empirical study of the archaeological evidence is the understanding of agency and practice outlined in the previous chapter. I first explore the relationship between practice and landscape in a little more depth to sketch the outline of a coherent heuristic approach that centres around the concept of dwelling, and how agents through practices create places in the landscape (Casey 1993, 2008; Ingold 2000; van Dyke 2008). Bodily engagements with materials, people and localities at particular points in time create memories and identities, and it is through this process that places become fixed entities in physical space. As such they also become resources to draw upon, utilize and alter to negotiate social identities, roles and relationships within communities. It is within this process of interaction that peoples' lives are structured by physical and social parameters, while they simultaneously maintain existing structures, alter them or create new ones.

These maintenances, alterations and creations can be studied through examination of landscapes, sites and material culture to the extent that we are able to divise patterns, relationships and networks in which these interactions and negotiations took place. We may not ultimately be able to discover the precise meanings, identities, and cosmologies that they encompassed, but we can nevertheless trace the contours of these interactions over time, how they changed and how they might have been maintained. This requires a close engagement with archaeological sites and materials, as well as with the *longue durée* (Barrett 1999, 2000; Hodder 2000). Archaeological excavations and survey serve as the primary means to recover and record contextual information on the materials discussed in this thesis, and to enable a characterization of the places and landscapes inhabited by early and middle Epipalaeolithic groups in the Azraq Oasis. While considering at length the site-formation processes that may alter our interpretations of the material culture from the site, a *châine opératoire* approach is taken to study the lithic artefact assemblages from the sites, maintaining a link with the concepts of agency and practice.

CORNERSTONES FOR A HEURISTIC STUDY OF LANDSCAPE

Landscape archaeologies inspired by phenomenological approaches have largely displayed a lack of interest in hunter-gatherer landscapes. Even a cursory glance over the literature that has developed phenomenological approaches to space and landscape in archaeology indicates that the majority deals with later prehistoric monuments, such as megalithic tombs, cursus monuments or henges (Bender 1998; Bender et al. 1997; Edmonds 1999; Edmonds 2004; Edmonds & Seaborne 2001; Fowler 2003; Thomas 1991, 1996, 2001; Tilley 1994, 2004). Generally speaking, much of landscape archaeology has been more at ease dealing with more readily perceptible field monuments and formally constructed environments rather than with discrete lithic scatters (Barrett 1994; Bradley 1998; Conneller 2005). However, due to the increased number of studies in ethnography dealing with hunter-gatherer landscapes over the past 15 years or so (Bird-David 1990, 1992a, b; Hirsch & O'Hanlon 1995; Ingold 1988, 1992, 1996; Layton & Ucko 1999; papers in Ucko & Layton 1999), archaeologists have begun to come much more to terms with studying the social and cultural landscapes of hunter-gatherers (Bradley 2000; papers in Cobb 2005; Conneller 2000, 2001 ; Conneller 2004; Conneller 2005; papers in Conneller & Warren 2006; Gamble 1999, 2007; Geneste et al. 2008; Hind 2004; Maher in print; McFadyen 2006; Warren 2006; Warren 2000, 2001). Undoubtedly, Palaeolithic or Mesolithic landscapes are largely not as readily accessible as field monuments of the Neolithic or Bronze Age. Environmental and geological change has affected earlier prehistoric landscapes to greater extent and sites have often been destroyed or buried, with artefacts having been potentially disturbed. Yet, even surface scatters of lithics can contribute to our understandings of the social and cultural construction of places and landscapes (Conneller 2000, 2001, 2005; McFadyen 2006; van Dyke 2008).

When dealing with archaeological hunter-gatherer landscapes, we are rarely confronted with large-scale ceremonial or residential architecture. More often than not we encounter the remnants of ephemeral, short-term campsites visible as lithic scatters in the modern landscape. Some will be largely deflated or eroded with little or no subsurface deposits surviving. Buried sites may be better preserved, but even fewer represent locales of repeated occupation over long spans of time. Such low-key landscapes are easily construed to be more 'natural' or unconstructed, since they lack the kind of monumental structures or substantial villages associated with the Neolithic and later periods. It seems that where there are no substantial physical structures, there are no places. Yet, we know this not to be the case. Both ethnographically, as well as archaeologically, we can consider situations where societies who do not build substantial architecture, monuments and settlements, have conceptualized space (Bradley 2000; Casey 1993, 2008; van Dyke 2008). This necessarily involves places, since there can be no landscape without them, and places necessarily exist as a result of human practices located in space and time. Even discreet and seemingly ephemeral lithic scatters represent residues of past human practices (Conneller 2000, 2006; Gamble 1999; Gamble & Porr 2005; McFadyen 2006). Indeed, stone artefacts are often the primary key to understand site function. To better understand the relationship between landscape and human practices situated within them, Tim Ingold (Ingold 2000) has recently advocated the use of the concept of *taskscape*. For Ingold, *taskscape* represents the nexus between temporality and history (Ingold 2000: 194). The concept attempts to unify technology and sociality as situated within time and space (i.e., the landscape). Following the work of many other anthropologists who have considered people's engagement in technological acts as primarily a social phenomenon (Audouze 2002; Lemonnier 1986, 1989, 1990, 1992; Leroi-Gourhan 1943, 1945; Mauss 1935; Pfaffenberger 1992), Ingold suggests that tasks carried out in the landscape focus past and present social relations in a particular time. As such, tasks involve agents and social structures, past and present knowledge, meaning and identities, tools and worked materials; they represent a web of social interaction. Like Ingold (2000: 195), it is to the entire ensemble of tasks that I refer by the term taskscape. In the same way that the enactment of techniques brings structures, agents and materials into being, temporality also crystallises in the *taskscape.* Tasks are necessarily carried out in time and in place; but, the passing of time is not passive. Through engaging in practices time is passed and engrained in our experience of the world. Carrying out tasks at specific places should therefore be considered like a passage:

> This passage is, indeed, none other than our own journey through the taskscape in the business of dwelling.(…) As such it [the taskscape] constitutes my present, conferring upon it a unique character.(…) The temporality of the taskscape is social, then, not because society provides an external frame against which particular tasks find independent measure, but because people, in the performance of their tasks, *also attend to one another* (Ingold 2000: 196).

With the concept of taskscape, Ingold powerfully links agency, structure, perception, temporality and space as a holistic concept. Clearly, this does not mean that there is one taskscape at any one point in time, but many interwoven *taskscapes* characterised by recurrent and interacting cycles of activities carried out by agents in time and space. Taskscape is constitutive of dwelling and stresses the fluid and dynamic characteristics of human life. Using taskscape in terms of landscape archaeology provides an entry point, since archaeologists are accustomed to studying the activities of groups of people in time and in space. While we may not be able to recover the meanings underlying the practices we conceptually refer to as the archaeological record, focussing on *taskscapes* nevertheless means that we are enabled to study social processes of structuration.

Lithic scatters and more substantial sites represent remnants and instances of past cyclic *taskscapes*, which we can study as part of archaeological landscape investigations. It is important, though, to remind ourselves that our techniques have been conceived and used within the realm of a positivist endeavour to quantify and objectify the past (Hodder 1999; Lucas 2001; Shanks & Tilley 1987b). While heuristic methods have to be employed to a degree and objectification is a necessary component of any archaeological practice, we must not forget that the focus of our studies should be the social realities of past existence, composed of the interdependence between multiple agencies and social structures. Yet, the study of stone artefacts is accustomed to focusing on particular techniques of manufacture and use in order to understand locally-specific activities. Especially the concept of the *châine opératoire* (Bleed 2001; Boëda 1988, 1990; Cresswell 1983, 1993; Edmonds 1990; Julien & Julien 1994; Pelegrin 1990, 1993 1995; Pigeot 1990; Pigeot 1991; Schlanger 1990a, b, 1994; Sellet 1993; Sigaut 1994) has been widely employed in lithic analysis, which provides a ready conceptualisation of the social constitution of technologies. What can be achieved through incorporation of the study of the concept of taskscapes in landscape archaeology is that we gain a better understanding of how places were created through the engagement of people in tasks and activities. These do not only involve materials, but social structures, agents and knowledge, and also provide points in the landscape at which memory comes to the fore (Barrett 1999; Casey 2008; Ingold 1993, 2000; McFadyen 2006; Thomas 2001, 2008; Warren 2006a; Warren 2006b).

Landscapes clearly do not consist just of recognizable sites, but also of the spaces situated in between sites. Site-based archaeology has perceived such areas as empty spaces; yet, in the past they formed constituent parts of peoples experience and engagement with the landscape. This introduces us to the consideration of movement. Phenomenological approaches to landscape (Edmonds 1999; Tilley 1994) have stressed that the way in which people move through the landscape is a primary means by which they are experienced and as a process by which agents are socialised (Barrett 1994). Ingold (2000: 197) also stresses the importance of movement with regards to the taskscape and the landscape. He argues that the landscape as a whole must likewise be understood as the taskscape in its embodied form: pattern of activities collapsed into an array of features (*ibid.:* 198). In his view, agents do not carve their life histories into the landscape; establishing sites does not mean an imposition on the land. Instead, both the taskscape and landscape are woven into the cycles of life in both. As both are constantly created and recreated, neither is built nor unbuilt (Ingold 2000:199). Moving through a landscape is in itself a purposeful activity and, thus, also forms part of the taskscape. Carrying out activities at particular localities also involves gestural and bodily movement, yet it is the movement from particular locales that introduces us to the concept of off-site archaeology. People move between sites and places along routes, passageways, tracks and paths. These movements constitute a primary way in which people perceive and experience landscapes (Ingold 2000: 228-231, 238-242). Places, be they sites or natural features, are revealed as people move toward, from or through them. The way in which people move through landscapes closely relates to peoples' prior social and cultural knowledge and understanding of space. Thus, movement is socially and culturally constituted, may be restricted or prohibited in certain instances, and encompasses the creation of social and cultural meaning. Mythical, cosmological or ideological concepts may be connected to places, at times reinforcing them or playing a pivotal role in transforming them. Thus, movement through landscapes draws on pre-existing social structures, ways of knowing where and how to go in space. Since space is social and meaning is revealed to the agent as she or he moves through their cultural landscape they are socialised, conforming or disregarding social conventions, norms or rules. Movement then is a form of practice, and as such forms part of the process of structuration.

Movement through a landscape necessarily involves passage from one place to another, perhaps transiting through places en route. But, what makes a place a place? If we follow Ingold (2000) and others (Barrett 1988, 1989, 1994, 1999; Casey 1993, 2008; Gosden 1994; Thomas 1991, 1996, 2000, 2008) the answer to this question must be that practices make places. Engrained in the concept of the *taskscape* is the idea that wherever people engage in activities with each other or by themselves places are made since meaning becomes attached to them. They become part of the social landscape through memory and through the constant and ongoing reworking of social structures at these locations. The memory of events that occurred at a particular point in time in a particular location fixes and recreates social relationships in the present to be drawn on in social discourses in the present (Barrett 1994). However, not all memories are wanted or actively sought after by agents. Place may act mnemonically and cause agents to remember past activities or events without the need for the agent to seek them actively. Here, past social fields re-emerge as part of the habitual engagement of people with places on the level of the subconscious. Important here is, however, the link between past and present activities and practices situated in time and place, since both are elements which can be studied in archaeology. Time, space and practice then constitute the elements that can help to understand patterns of the manifestation of past social engagements between people, objects, the environment, animals, plants and the landscape. These conditions, as I put forward in the third chapter, are accepted here as somewhat universal properties which can allow us to study past social processes through the means of the archaeological remains of the past in the present. Together, these encounters with the archaeological materials constitute a, however limited, insight into past *dwellings* of people and processes of social and cultural change.

STUDY REGION AND SITES

The Azraq Basin in eastern Transjordan occupies an area that is geographically well-defined and contains a series of Epipalaeolithic sites. Ayn Qasiyya and AWS 48, the two sites that serve as case studies here, were first described by Rollefson et al. (Rollefson 2001) as part of a survey of the Azraq Wetlands Reserve, in which both are located. These two sites are suitable for the examination of the questions previously outlined for a number of reasons. They are situated within what is generally considered a semi-arid to arid region corresponding to the cultural periphery often discussed in social evolutionary narratives (see chapter 2). From early on in this study material culture from the sites, i.e., lithic artefacts, indicated a likely early Epipalaeolithic date for Ayn Qasiyya and a likely middle Epipalaeolithic date for AWS 48. This provided an opportunity to enhance our understanding of the Azraq wetlands landscape during the earlier part of the Epipalaeolithic when few sites of this time period are known in this particular area. They also promised to add further insights into broader Epipalaeolithic settlement patterns in the Azraq Basin. Out of the considerable number of sites documented by Rollefson et al. (2001), Ayn Qasiyya and AWS 48 offered the best opportunity to develop a coherent picture of the early and middle Epipalaeolithic in the oasis. Although different in character, they provided adequate samples of material culture and associated finds to characterize the occupations at these localities sufficiently. Ayn Qasiyya, in particular, offered an opportunity to obtain rare samples suitable for radiometric dating, as well as geoarchaeological evidence that would augment our understanding of the palaeoenvironmental conditions in the oasis. A more detailed discussion of the study area and its archaeology can be found in chapter 5.

The surveys and excavations at AWS 48 and Ayn Qasiyya proceeded using commonplace and accepted fieldwork methods and techniques. Given the nature of the sites and the likely importance associated with the distributional patterns of lithic artefacts, a 1x1 m grid system was established across each site (Leroi-Gourhan 1950). Although excavations were carried out in pre-defined arbitrary units or spits, the natural boundaries of archaeological deposits and features were respected during excavation, and finds separated, first according to context, and secondly according to excavation unit (referred to as stratigraphic unit; for more details see Appendix I). This required a two-tier recording strategy, which involved the use of spit and square meter sheets, as well as single context recording (Barker 1993; Westman 1994). This system was hierarchical in as much that several Stratigraphic Units (referring to a unique combination of a spit and square meter) were defined by the context they were situated in. Nested, fine sieves (5 mm and 2 mm) were employed to first dry sieve and then wet sieve all excavated soil from archaeologically significant deposits. At Ayn Qasiyya an arbitrary datum of E1000.000/N1000.000/H506.000 m was established, while at AWS 48 the arbitrary datum was assigned the coordinates E500.000/N500.000/H516.000 m. At AWS 48 this datum was also used as the basis for the survey grid.

Locating the excavation trenches at Ayn Qasiyya posed a necessary source of potential bias for the archaeological samples obtained from the site. Except for exposures in the northern wall of the Ayn Qasiyya pool (see chapter 5 and 6), the site is today buried by a topsoil of considerable thickness and cementation. While two trenches were placed in close proximity to exposed concentrations of deposits and finds (Areas A and C), others were placed at random across the estimated area of the site (Area B and D). These trenches provided discontinuous snap shots of the site, but no large, open-area exposures. The excavations were too limited both in terms of time and resources to facilitate such a large-scale excavation. Although it could be argued that this provided little control over the sampling of the site, it was felt that this approach would characterize the site adequately and obtain sufficient samples of material culture to reconstruct the chronological, cultural and ecological context.

As part of the post-processual critique it has been argued that archaeological excavation techniques serve to fragment and decontextualise past social contexts, and only facilitate the objectified, testing of functional models (Chadwick 1997; Hodder 1997, 1999; Hodder & Berggren 2003; Lucas 2001). Instead, archaeologists have called for the establishment of reflexive excavation methodologies that take into account the situated nature of archaeological practice in the contemporary world, and the social, economic and political biases it introduces. This, it has been argued, would situate interpretation at the heart of the archaeological fieldwork process, and would move archaeology toward a more contextual, reflexive and multi vocal engagement with the past in the present. It has to be admitted that such a reflexive excavation methodology was not developed for the present study. This is partly due to the lack of the kind of social and political context in which some of these calls for a multi vocal and reflexive excavation methodology originated. As a research driven excavation, i.e., not developer funded commercial investigation, this project was launched within different social and political parameters (Chadwick 1997; Lucas 2001). Instead of establishing control or disengagement with the archaeological process in the field, as it has been argued some recording systems do, working with students and archaeologists from a variety of backgrounds over the course of this project established a very multi vocal and diverse engagement with the archaeology at the sites from the outset. It also has to be said that sites such as Ayn Qasiyya and AWS 48 offer very different, or rather fewer, opportunities to engage in on site interpretation and discussion, since much of the archaeological patterns and analysis derives from post excavation analysis and work. Nevertheless, an effort was made to encourage every project participant's input by emphasizing the importance of enlarged interpretation boxes on recording sheets and calling for their input (see Appendix I & III). It was felt that these mechanisms catered sufficiently to facilitate for interpretation of archaeological contexts in the field, while maintaining some degree of control, comparability and coherence in the recording system. Other multi vocal engagements, for example with the local community, were however not as explicitly sought. This is once again due to the lack of financial resources and time, but it is hoped that such work can be conducted in the future.

The sites investigated in this study are situated in a nature reserve, which has facilitated their preservation. The village surrounding the reserve has expanded rapidly over the course of the last 30 to 40 years and has resulted in the destruction of at least one known archaeological site (Azraq 18 now underneath a farm house), while another is now inaccessible (Rollefson 1983; Ain al-Assad is today inside the Royal Jordanian Air Force Base in Azraq and therefore off-limits). The known distribution of archaeological sites in the oasis and the possibility to investigate these two in particular is therefore a reflection also of the modern context of development and related issues of preservation. Modern landscape change is influencing what we can learn about Epipalaeolithic landscapes and these biases need to be taken into consideration if we seek to interpret the past on the basis of our modern engagement with it. A further source of bias has already been alluded to: time and money. The undertaking of a complex and large scale project such as this as part of graduate student research imposes necessary limitations of time and resources. Only limited amounts of funding could be found to support this project in its initial two seasons, which limited the amount of time that could be spend in the field, and thus the work that could be undertaken. While these were limiting factors, a sufficient amount of excavation was carried out resulting in the recovery of considerable amounts of material that could be drawn on for interpretation.

SITE FORMATION PROCESSES AND SPATIAL ANALYSIS

It has often been said that the study of site-formation processes and spatial analysis are difficult to reconcile with the kind of theoretical programmes post-processual or interpretative archaeology has developed (Chadwick 1997; Hodder 1999a). Interpretative archaeologies' interest in how claims of a singularly true past were actually a result of modern power structures and relations (Shanks and Tilley 1987a, b) lead many to reject the methodological rigour developed during processual archaeology's focussing site-formation processes to span the gap of the middle range and arrive at testable predictions and general laws about past human behaviour. The underlying positivist assumptions engrained in this perspective have been variously exposed and critiqued (Hodder 1982b, 1986; Shanks 1987b). Yet, it remains crucial to consider the modification of archaeological sites and assemblages by processes other than human agency, that affect our ability to gain access to the social and cultural processes and patterns of the past. One cannot underestimate the role of post-depositional modifications especially with respect to the Palaeolithic. Thousands and even hundreds of thousands of years have had a significant impact on the composition of assemblages and the integrity of archaeological sites. This is not to say, however, that the heuristic assessment of the condition of a site and its contents should be an end in itself or indeed the sole outcome of archaeological research. Rather it should be considered as a means to an end, to form a full and complete understanding of the formation of an assemblage that evaluates natural versus cultural processes. Notwithstanding the critique of modernity and the problematic issue of the nature/culture divide (see chapter 2), the principle of uniformitarianism provides the most probable and reliable methodological principle to tease apart anthropogenic versus non-anthropogenic processes and patterns. That is not to say that the same principle should also apply to provide cultural explanations of archaeological patterns. As archaeologists embedded in the present we need to necessarily use these tools of assessment available to us. Although they reinforce certain Cartesian dualisms, it is clear that an empirical study of the archaeological datasets available to us need to necessarily objectify and categorize processes as part of our engagement with contexts and materials. This level of interpretation is, however, somewhat separate to the process of interpreting archaeological patterns defined thereafter. Nobody can deny that natural processes are real and have an affect on archaeological remains, and it is these processes that need to be monitored if we want to be certain that the patterns we observe relate to past practices and actions.

Concern with formation processes was, of course, the principal focus of the New Archaeology and what later became processual archaeology. Although scholars had paid some attention to the basic questions of how certain archaeological contexts formed, indeed there was even a basic recognition by Thomson in his three-age-system of the contextual dependency on formation processes when he distinguished between closed versus unclosed finds (Trigger 1989), it was the New Archaeology that declared the study of site formation to be the most critical aspect of archaeological investigation (Binford 1965, 1978, 1983). These scholars sought to develop this approach by adhering to scientific principles introducing the rigorous testing of hypothesis and model-building. Indeed, one of Binford's (Binford 1967) first influential publications was concerned precisely with the relationship between interpreting the archaeology of pit features using ethnographic parallels on the basis of analogy. Binford's aim was to show explicitly the utility of ethnographic analogies for archaeological observation. This established ethnoarchaeology as a subdiscipline within archaeology, marrying ethnographic studies with archaeology to interpret the material record.

From explaining the function of archaeological tools and features Binford and others soon turned their attention toward the study of entire sites and settlement patterns on the basis of ethnoarchaeological studies and analogy. It is unsurprising that many of these studies attempted to deal directly with hunter-gatherer archaeology and sought to establish explanations for the Palaeolithic, in particular. John Yellen's (1977) work amongst !Kung San hunter-gatherers in southern Africa examined contemporary San sites as a means to understand the composition and function of Palaeolithic sites elsewhere. Gould's work likewise sought to use ethnographic observations to consider universal principles responsible for site formation and to use these principles to explain archaeological contexts (Gould 1967, 1968, 1978a, b, 1980; Gould & Yellen 1987). Binford's (1983) work incorporated both the observation of animal populations around waterholes, as well as fieldwork amongst Nunamiut groups (Binford 1978) to understand early hominin sites, as well as the specific adaptations of Neanderthals to cold climatic conditions in northern Europe. Researchers thus focussed on using analogy and uniformitarianism to understand archaeological patterns and sites. In their view, this would enable them to infer behavioural regularities from both the ethnographic situation and the archaeological case and lead to the establishment of generally applicable behavioural correlates, which connected material correlates to specific sets of behaviour. The inherent assumption was that past behaviours were the critical determinant of the evidence provided by the archaeological record and that these could be read off by applying the correct methodology.

Schiffer (1972; 1976; 1978; 1987) was one of the first and most important critics of this concept. He disagreed with Binford that the archaeological record could be understood as a direct, fossilized representation of past behavioural patterns and systems. Schiffer argued instead that the archaeological record was the result of multiple natural and cultural processes, which alters the systemic context into the archaeological context.

> Although we would wish it, the past manifest in artefacts does not come to us unchanged. The burden that archaeologists assume for access to the past is considerable, that of untangling the many events and processes that contribute to the observed variability in the contemporary properties of the archaeological record (Schiffer 1987: 5).

Schiffer was the first to explicitly distinguish between cultural and natural transformations to the systemic context whose joint agencies resulted in the creation of the archaeological record. Although subtle in its distinction to processual archaeology, Schiffer's behavioural archaeology dampened the early optimism Binford and others had conveyed in the reliability of their methodologically rigorous approach. Rather than focus on ethnoarchaeological approaches and analogy, Schiffer stressed the role of site preservation, the importance of the depositional context, and the role of the enormous lengths of time involved in the creation of the archaeological record (Schiffer 1987: 8-9). This encapsulates the transformation view, which suggests that the present composition of the archaeological context represents a distortion of the relationship between artefacts and behaviour. Given these transformations and distortions, Schiffer suggested that archaeologists must filter them out of the archaeological context using appropriate analytical and inferential methodologies that were based on the understanding of the cultural and natural processes. But Schiffer also stressed the importance of considering the sample biases inherent in archaeological investigations of sites. In his view, archaeological samples represent human behaviour only very selectively, not just due to the differential preservation properties, but also because of the differing research designs and methodologies used in archaeology.

Although Binford (1981) vehemently disagreed with Schiffer's argument that the basic principle of processual archaeology was flawed, the impact of Schiffer's work cannot be underestimated. While it seems that his view is only different to the processual position in nuances, it is clear that Schiffer's perspective marked the beginning of the study of site-formation processes in archaeology by emphasising the complex role of natural and cultural processes in the formation of all archaeological contexts. While much of our understanding of how archaeological sites formed, especially with regards to the Palaeolithic, owes a great deal to ethnoarchaeology, Schiffer highlighted the importance of the numerous natural processes that could affect the preservation of archaeological sites and assemblages. Where Schiffer and Binford's views diverged was in the study of cultural process. It seems clear, however, that Binford's view of the link between past behaviour and present day archaeological record as a one-to-one relationship, where behaviour could be correlated with laws and regularities related to adaptation. Instead, Schiffer outlined the various culturally-dependent parameters involved in transforming the archaeological record, in addition to the natural processes affecting its preservation and recovery (Schiffer 1976; 1987). He also stressed the importance of considering the life histories of artefacts and how these shaped their form, quantity, production and deposition. Furthermore, Schiffer's view also encompassed a stress on the spatial distribution and patterning in the archaeological record and how it, too, could be affected by transformation.

The difficulty in relating the static remnants of past activities to human behaviour or practice was further highlighted, albeit from a different perspective, by Hodder (Hodder 1982a, c). Like Binford, Hodder used an ethnoarchaeological approach to understand material patterning, although he did not in the first instance deploy this understanding to frame an archaeological case study. Instead, Hodder highlighted how beliefs, rituals and social life in general had a direct impact on how material culture was made, used and deposited. Considering different understandings of dirtiness and cleanliness, for example, he showed how these concepts had a direct influence on the spatial patterning of archaeological materials. This view, while also relying on ethnographic observation and analogy, revealed a very different perspective to that offered by either Binford or Schiffer. In Hodder's view, material culture was not just a result of human activity, but it was more importantly a symbolic resource. He argued that while it's spatial and depositional patterning, as well as the life history of artefacts was influenced by their symbolic meaning, they were also active components of the social and symbolic system. People employ material culture to negotiate social roles and identities, access or alter power relations, and reinforce or change the social fabric of society (Hodder 1982b, 1986). Hodder became especially critical of the idea that behaviour could be directly read off the material patterning in the archaeological record, without paying close attention to the social, cultural and overall archaeological context of their use and deposition. This perspective, as well as other related work on material culture (Appadurai 1986; Hodder 1989; Miller 1982; Miller 1987) and analogy building (Stahl 1983; Wobst 1978; Wylie 1982, 1985), did not touch on the issue of natural modifications that affected archaeological sites and assemblages.

It is fair to say that some of the differences and contradictions between these various approaches have never been fully resolved, with many researchers continuing to subscribe to one or the other perspective. This is most apparent in the difference between Palaeolithic archaeologists and archaeologists studying later periods. Behavioural or processual approaches are generally speaking still more commonplace in the study of the Palaeolithic (Gamble 1999, 2004, 2007). This is partly because archaeologists working in the Palaeolithic deal with archaeological signatures of past human practices that are much more ephemeral, more easily disturbed, and exposed to prolonged periods in which post-depositional modifications occurred. Another perceived obstacle is the nature of the archaeological assemblages and deposits as merely representing palimpsests of past human action. It has therefore been argued that long-term processes can be more readily tracked on the basis of the Palaeolithic record (Clark 1993; Lindly & Clark 1990). Some have taken this to mean that individual themes of interpretative archaeology cannot be discussed using these datasets (Gravina 2004). This notion is partly due to the fact that post-processual and interpretative archaeologists have rarely engaged with the Palaeolithic in their seminal studies, and this tide has only gradually been changing recently with more scholars becoming more interested in the themes of identity, agency and landscape in deep prehistory (Dobres 2000; Gamble 1999, 2004, 2007; Gamble & Gittins 2004; Gamble & Porr 2005; Sassaman 2000; Sinclair 2000; Wobst 2000). More importantly, the argument that agency cannot be examined in Palaeolithic societies, since individuals are difficult to define from the palimpsests that these archaeological sites are said to represent, is fundamentally flawed. It incorporates a deep misunderstanding of what agency entails. That agency relates to individuals and their actions alone or in a direct way is a commonplace misconception (Barrett 2000; Gardner 2004, 2007; Johnson 2004). As I have discussed at length in chapter 3, agency involves both individuals and social structures, which bring each other into being in a process of mutual structuration. Suggesting that agency cannot be examined in the Palaeolithic since individuals are more or less invisible in the archaeological is missing the point, since it is not these individuals agency theory is concerned with as such (see chapter 3).

When it comes to the natural processes that affect the preservation of the archaeological record, it is hard to deny that these have an effect on the nature of the archaeological signatures we encounter today. Their effect on the preservation of archaeological sites and assemblages has long been recognized and has been studied in ever more detail (Bar-Yosef 1993; Binford 1983; Butzer 1964; Cahen & Moeyersons 1977; papers in Goldberg et al. 1993; Gregg et al. 1991; Nash 1986; Rapp 1998; Schick 1986, 1987a, b; Schiffer 1976; Schiffer 1978, 1987; Waters & Kuehn 1996; Wood & Johnson 1978). This has never been denied even by proponents of post-processual and interpretative archaeology schools, although they have rarely tackled these issues head on. Although this thesis clearly subscribes to the concepts of human agency and practice as ultimately shaping archaeological patterns, modifications by natural processes did of course occur. Schiffer's (1987) outline of the natural transformation processes affecting archaeological sites are therefore fully acknowledged. To arrive at a complete understanding of the Azraq sites archaeological remains, I will therefore outline the sedimentological characteristics of the significant archaeological deposits, the composition of the lithic analysis and, to a certain extent, the spatial configuration and distribution of archaeological finds. It is, however, argued that an understanding of the social and cultural contingencies must rely on the framework previously outlined to interpret the patterning that emerges after natural agencies have been filtered out of the picture. In contrast to Schiffer, it is argued that archaeological assemblages thus analysed do provide sufficient contextual information to characterize past practices, despite acknowledging that our samples are always inadequate and partial. I would argue that indeed one of the strengths of an agency approach is that it can consider the long term processes that shaped and were being shaped by material culture precisely because it does not depend on the study of individuals,. In the case of earlier prehistory it is precisely the longevity of material culture patterns, their homogeneity, which is of interest in investigating social structures. I will return to discuss this point more directly with respect to the archaeology of the Azraq Basin and the Epipalaeolithic in chapter 10.

In order to tease apart natural from cultural agencies and to verify the suitability of the archaeological samples recovered in the excavations at Ayn Qasiyya and AWS 48, I will rely on Schick's (Schick 1986, 1987a, b; Schick & Toth 1993) extensive experimental study of Palaeolithic site-formation processes. Schick was particularly interested in modelling how natural processes affected the composition and distribution of archaeological sites that consisted mainly of the debris of lithic artefact manufacture. Given that she was primarily interested in the genesis of early hominin sites she situated a number of experimental sites in the Koobi Fora region of Kenya. Using experimentally-generated lithic production waste that was specially labelled and marked, she created a number of sites in a variety of environmental contexts. The particular focus was on monitoring the influence of fluvial activity on these sites, so that many were located in or next to springs, but a few were also placed in wetlands. The context of these sites can be considered quite comparable to the sites in the Azraq Oasis. Leaving the sites to develop for some time Schick returned to the locations periodically to monitor progress, before relocating and excavating them using standard techniques. This enabled her to compare the pre-deposition composition of the assemblage with the post-depositional excavated sample. Since various pieces of debitage and cores help to identify different technological processes and activities at the site, Schick's work highlighted how natural agencies could affect the analytical process and understanding of the assemblages when examined by archaeologists.

This work is a classic study in the use of uniformitarian principles to try to understand how changes to the composition of an assemblage come about, and enabled Schick to devise a comprehensive system to monitor the integrity of archaeological sites and the reliability of samples obtained through excavation. She outlined a number of critical factors that have to be considered and are summarised as follows (after Schick 1986: 94 112):

1) Assemblage composition (size, artefact class, distribution, and core:debitage ratio) provide a useful initial insight into the integrity of the assemblage. Significant over-representation or under-representation of either items of particular sizes or types may indicate disturbance/removal due to post deposition,
2) Intra-site spatial patterning due to size must be considered and monitored, since fluvial or erosional activity will affect differently sized objects in different ways,
3) Spatial gaps in the distribution of artefacts may indicate redistribution or winnowing of parts of the assemblage,
4) If artefacts can be refitted it is as a strong indicator for the intactness of the assemblage composition (see also Villa 1982),
5) Attention must be paid to the sedimentary and micro-sedimentary context of the deposits excavated to consider potential natural and environmental processes that may have affected the assemblage,
6) The inclination and orientation of artefacts can give insights into flow direction and or erosion at a site. If the site remains undisturbed artefact orientation should be more random, while displaying a flat inclination if they were deposited on living or occupation surfaces, and
7) Damage and other physical or chemical modification to artefacts can indicate significant disturbance of a site. Artefact abrasion, rolling, edge damage and patination patterns should be recorded.

Using a number of these points as a guideline, a number of observations were incorporated into the artefact recording procedure (for more details and definitions please see Appendix II). The process of lithic analysis was split into two stages:

1) Sorting stage

In this stage lithic artefacts were sorted into commonly used categories (cores, core trimming elements, flakelets, flakes, blades, bladelets, retouched/secondarily modified pieces, burin spalls, chips, and varia). All flakes, blades and bladelets were further subdivided into complete and broken pieces. This procedure followed an essentially mass analytical approach (Ahler 1989; Austin 1999; Sullivan III & Rozen 1985) that provided initial data on assemblage composition and the size of artefacts to inform the site formation analysis and technological understanding of the assemblages.

2) Analysis Stage

All retouched pieces, core trimming elements and cores, as well as random samples of complete pieces of debitage (excluding flakelets, burin spalls and chips) from select contexts were recorded using technological and typological criteria. Technological characteristics and variables were defined following Brezillon and Tixier (Brezillon 1968; Tixier 1963; Tixier & Newcomer 1974), while retouch was recorded using a system analogous to the Wembach module (Baird et al. 1995). The typologies used followed those of Bar Yosef (Bar Yosef 1970) and Goring Morris (Goring Morris 1987). For further details see Appendix II.

The inclination and orientation of artefacts was not recorded, partially due to the sheer number of artefacts found and time constraints that would have been imposed on recording each object's position individually, and because initial assessment of the archaeological deposits suggested that no *in situ* occupation surfaces or living floors could be expected to be found. Due to time constraints refitting was also not attempted. Point 6 was covered as part of the geomorphological and palaeoenvironmental program at the site, which recorded the composition of the various deposits and interpreted these results. It was felt that taking these points into consideration would provide a successful means to monitor the composition of the archaeological artefact samples. These aspects will be discussed in detail in the second part of chapters 6 and 7, referencing more directly some of Schick's work.

The above outline already indicates the importance of also developing an understanding of the spatial distribution of the lithic assemblages at each site. A concern with the spatial distribution of finds in Palaeolithic and Mesolithic sites can be recognised from relatively early on, fostered by the recognition that the absence of often clearly recognizable structures, such as pits, hearths or indeed walls, an understanding of the spatial arrangement of camps is gained by paying attention to the distribution of all finds. Initially this operated on the basis of examining site plans for obvious patterns or clusters of materials. Grahame Clark's (Clark 1954) study at Star Carr, for example, used the spatial distribution of bone and flint artefacts to infer the character of the habitation area. Leakey's (Leakey 1971) work at Olduvai Gorge also used the vertical concentration and horizontal arrangement of faunal remains and early hominin stone artefacts to delineate living floors or occupation surfaces. However, this work focussed little on site-formation processes as such. The ethnoarchaeological work by Binford (1978; 1980; 1983) and others (e.g. papers in Gamble & Boismier 1991; Hodder 1982a; Kent 1987; Yellen 1977) already had a more direct impact on the understanding of sites. Examining the use of space by contemporary hunter-gatherer communities various aspects of spatial patterning were illuminated. However, more often than not this lacked an appreciation for the impact of natural processes on the preservation of these patterns. In this respect, Schick's (1986) work is important, since she considered both the overall inventory from archaeological sites, as well as the impact natural processes could have on spatial distribution. Others have investigated the same issue from similar perspectives now often drawing on more sophisticated spatial analysis tools provided by GIS software. It is fair to say that some of the initial optimism evident amongst ethnoarchaeologists that they could confidently reconstruct habitation areas and the internal structuring of sites on the basis of intra-site artefact distribution patterns has been somewhat dampened (O'Connell 1987), since natural transformations can indeed have a significant impact on the spatial configuration of archaeological finds (Schick 1987a, b; Schick & Toth 1993; Schiffer 1987).

It is however also important to recognize that spatial analysis in archaeology can easily retreat into an abstract treatment of space, which lacks an appreciation of agency. While it is important to understand the spatial patterning and distribution of features, archaeological materials, and sites in a landscape, we must remind ourselves that the abstract objectification of space by the means of mapping and quantification is only a tool to collate and convey representative information (Cosgrove 1984; Thomas 1993). Methods of spatial analysis are but one tool in our inventory to render a complex mass of information intelligible to us, but they do not possess an inherent quality of explanation. It would be wrong to assume that by amassing and quantifying spatial information alone provides straightforward information about past social processes. It was this conviction that drove much of ethnoarchaeological studies in archaeology and it depended on the identification of cross-culturally applicable regularities that could be studied in the present to understand the past. In the context of the present work spatial data is used to detect potential patterns indicating disturbances, as well as potential inter-site patterns, but there is no attempt made to rely on over quantification to use this data as a means in itself. The conceptual program outlined before that focuses on practice and agency is kept in mind at all times to retain a focus on the social construction of spaces to avoid falling into the trap of abstraction.

For the purpose of this thesis, I will draw on conventional means to characterise spatial distribution. As is common on Palaeolithic sites of this nature a 1x1 m grid system was used to provide spatial referencing for the recovered finds (see above and Appendix I). Owing to the size of the trenches excavated at Ayn Qasiyya, spatial analysis of the distribution of finds proved impractical, since data was not available from continuous exposures and would thus have provided too restricted snapshots of the distribution. Since AWS 48 is a surface site a variety of techniques were employed here to quantify and monitor spatial distribution. While variously subdivided grid systems were used in surface collection and excavation, an additional effort was made to sample the spatial distribution of finds by recording the 3 dimensional coordinates of artefacts using a total station at one cluster. These procedures provided sufficient control over the distributional patterns, or lack thereof, at the site and allowed the monitoring of any post-depositional disturbance effects.

A basic analysis of site-formation processes was incorporated into this study to monitor and assess the effects of post-depositional transformations to the study sites. Although the theoretical background from which a majority of site-formation process studies derived from is very different to that put forward as part of this thesis, it is essential that certain protocols are adhered to. Natural processes affecting the preservation and current condition of the archaeological context are critical to enable a discussion of the technological patterns in the lithic assemblages and to facilitate a complete understanding of the integrity of the site's archaeological remains. Given the timescales involved since people came to the Azraq Oasis and occupied these sites until their excavation as part of this project, the impact natural processes might have had on the preservation of the archaeological remains is important. These require evaluation and monitoring to enable us to move toward a socialised understanding of these hunter-gatherer landscapes. This does not imply that behavioural or processual frameworks have to be used in the interpretation of these contexts, nor indeed that they represent the appropriate means.

LITHIC ANALYSIS AND *chaîne opératoire*

The Ayn Qasiyya and AWS 48 lithic assemblages recovered through surface collections and excavations are examined here using the concept of the *chaîne opératoire* as a guiding principle. This concept has been alluded to earlier in this chapter, as well as in chapter 3. Here it will be discussed primarily with respect to its use in lithic analysis generally and in this thesis. The examination of chipped stone tools on the basis of the *chaîne opératoire* aims to reconstruct as much as possible about the sequence of techniques involved by arranging them in a chain from raw material procurement to use and abandonment. Rather than looking at the final form of retouched items alone by the means of typological classification this approach focuses on the dynamic processes involved in human technologies and the similarities and variations between sites or assemblages to ascertain differences in techniques of manufacture. On this level the concept of the *chaîne opératoire* could be easily equated with sequence models used in lithic analysis (Bleed 2001). However, while the *chaîne opératoire* encompasses a heuristic sequential approach to the study of technology which is where the similarity to other sequence models in lithic analysis lies, it is also embedded within a wider sociological and philosophical framework (Conneller 2005, 2006; Cresswell 1983, 1993; Dobres 2000; Edmonds 1990; Ingold 2000; Lemonnier 1986, 1989, 1990; Pelegrin 1990, 1993 1995; Pfaffenberger 1992; Pigeot 1991). Indeed, the theoretical basis on which sequence models and the *chaîne opératoire* operate differ quite substantially. Whereas the former are more commonly associated with behavioural approaches (Bleed 2001) the latter focus on social conditions in which technology operated. Given the theoretical outline discussed in chapter 3 and earlier in this chapter, it is obvious that the latter perspective is preferred here.

Although *chaîne opératoire* approaches have been used to study a great variety of technologies and material culture (Lemonnier 1986, 1989, 1990; Sigaut 1994), it has been widely applied in lithic analysis (Bleed 2001; Boëda 1988, 1990 ; Julien & Julien 1994; Pelegrin 1990, 1993 1995; Pigeot 1990; Schlanger 1990a, b, 1994; Sellet 1993; Shott 2003). Lithic artefacts contain on their surface information directly related to the techniques that resulted in their creation. Negative dorsal scars, platform characteristics, shape, size, and modes of retouch are amongst many attributes that allow the reconstruction of an objects place in a technical chain. Thus ordered, each piece provides a link to the enable the overall reconstruction past technological processes. Marcel Mauss is commonly considered as the first person to outline the concept of the *chaîne opératoire*. Mauss (Mauss 1935) realised early in the 20th century that human technologies do not relate to instruments or artefacts *per se*, but to the active involvement of the body and owes much to Durkheim's sociology of knowledge (Durkheim 1982 (1895); Durkheim 1997 (1893)). Mauss argued that social traditions were expressed through particular movements of the body and that these movements related to the traditional nature of techniques, which were highly routinized. This relationship between social traditions and the individual artisan unfolded, in Mauss' view, during the enactment of practices and the use of materials (see also Dobres 2000: 153-4). Thus, for Mauss all actions, even if they appeared natural, were learnt and socially constituted. Although Mauss (Mauss 1935, 1950) incorporates quite a normative understanding in his work, he also emphasised the sequential order of technical acts. While Heidegger considered the basis of this relationship between the body and technique from a phenomenological point of view, Mauss took a more normative position. Thus, there is quite a direct connection between the enactment of *techniques* and the idea of *practice* (Dobres 2000, Ingold 2000). Techniques, then, are a form of practice which relate to the skilled making and production of objects, and the transformation of materials. Like practice, techniques involve bodily movements, mental activity and particular forms of knowhow, motivational knowledge, and involve things. Indeed, things, or artefacts, are an even more important aspect of technological practice, than they are of practice *per se.* The intentional motivation behind technical practice is directly aimed at the object or at a material. A technical practice is geared towards affecting material, and agents do so knowledgeably and with a conscious intention. Mauss' work had a direct influence on the work of Leroi-Gourhan (Leroi-Gourhan 1943, 1945) who concentrated much of his efforts on Palaeolithic archaeology. Using a combination of Mauss consideration of gesture and technique Leroi-Gourhan considered their origins in the Palaeolithic and founded the idea of technology studies in the French school of Palaeolithic archaeology. His ideas were instrumental in establishing the field of *châine opératoire* studies.

Although the concept of the *châine opératoire* remained a strong focus within French Palaeolithic ethnography and prehistoric archaeology, in the latter case often combined with detailed lithic replication studies, it did not have a major impact for some time elsewhere. Bleed (2001) has shown how sequence models for the analysis of lithic assemblages developed elsewhere more or less independently of the *châine opératoire* approach. However, as previously argued, these were based on quite different epistemological premises than the sociological basis of the *châine opératoire* deriving from Mauss s influence. Concerns with agency and practice resurfaced as part of a re-engagement with the French sociological tradition in technology studies with the advent of contextual and interpretative archaeologies (Dietler and Herbich 1998; Dobres 2000; Edmonds 1990; Lemonnier 1986, 1989, 1990, 1992; Pfaffenberger 1992; Schlanger 1990a, b). Initially driven by a reconfiguration of the conceptualization of material culture, archaeologists soon began to pay more attention to the technological processes involved in its creation and were attracted to the *châine opératoire* approach, because it offered a dynamic view on technology and practice.

The key understanding of this anthropology of technology is that technical activity simultaneously involves the bodily, mental and knowledgeable capabilities of the agent in a process of material creation and transformation. A *technology* in this view represents a network of practices, i.e. of techniques, which simultaneously incorporate and recreate social conditions through practice. Social order, structures of society, norms and values, are contained within the understanding of how things are done and the right way of achieving change (Pfaffenberger 1992). These forms of understanding come into being through practice, and are reproduced in a constant, patterned and routinized process of technical action. Technology is therefore also routinized practice, and furthermore, represents a particular, culturally and historically situated *routine*. In the words of Ingold when agents produce something or are involved in technical activity of any kind they do not do this in isolation, but they also attend to each other (Ingold 2000: 212). Technical practice is situated in social situations, occupying particular points in space and time, and they are often *communal* activities. But, even when agents carry out activities alone, they also reproduce the communal forms and understandings of *technology*, as they reproduce previous kinds of knowledge and understandings.

It is important to be aware, however, that the concept of the *chaîne opératoire* is also a particular means of understanding past technological systems that is embedded within our modern day perceptions. It is accepted here as a heuristic principle that can be utilized to empirically study the past, but we have to be aware of some of the problems associated with it. Although the *chaîne opératoire* approach has here been identified with a specific sociological understanding, linking it with practice and social context, it is fair to say that it has been used in a much more functional sense within the field of Palaeolithic archaeology until recently. Often the social context of the actions and gestures that comprised the *chaîne opératoire* was neglected, focusing instead on trying to reconstruct rather fuzzily defined cultural traditions of manufacture (Dobres 2000). A further issue is the often linear depiction of the *chaîne opératoire* in publications, which is directly related to the ordering of the techniques used in a chain of events. This also owes much to the functionalist and structuralist antecedents of technology studies in French ethnology and archaeology. Although these provide detailed information and basis for comparison, many appear to entirely neglect the agents who were responsible for implementing these technical gestures and techniques (Dietler & Herbich 1998; Dobres 2000). Such linear depictions shall therefore be avoided here, in favour of a more detailed descriptive approach that takes into account the agency of the prehistoric artisans.

The concept of the *chaîne opératoire* therefore provides a direct link between the empirical engagement with the lithic artefacts from the study sites and the theoretical framework outlined earlier. Earlier I have discussed the two stages of lithic analysis used in this thesis (see above). These serve as the basis to obtain technological information that can be used to construct the *châine opératoire.* Stage II of this analytical procedure in particular provides a range of observed attributes and variables that can be quantified and statistically collated and compared. It is important to point out that there is not one analytical procedure common to all *châine opératoire* in lithic analysis. Attribute data can be used as much as data obtained from mass debitage analysis, refitting or use wear. Indeed, it can be argued that *châine opératoire* studies call for a holistic approach that considers past technologies at each step from raw material procurement to discard, as well as the network of technologies within which each technical sequence is linked. The approach followed here however is limited due to necessity and practicality. The volume of data obtained as part of the analysis outlined here already proved sufficiently large and complex enough to pose challenges to the extraction of meaningful patterns. Certain analytical procedures were therefore not employed, although their potential usefulness is fully recognized. For example, a comprehensive raw material survey to discover the sources of flint used on the study sites was not carried out. It would have simply required too much time and resources, which were already limited in the fieldwork project. A use wear analysis was also not carried out, although I fully recognize the importance of such studies (Richter 2007a). Again, a use wear study was deemed unfeasible due to the time limitations. One of the potentially most insightful procedures for lithic analysis, refitting of waste products and cores, was also not attempted. It could therefore be argued that certain elements of the *châine opératoire* were immediately inaccessible for reconstruction due to the restricted analytical procedure employed here. However, it was felt that the comprehensive recording strategy employed would provide sufficient information to enable a detailed reconstruction of the past lithic technologies at the sites.

In the initial stage of artefact sorting, basic categorizations of the material were applied and the amount of pieces within each category counted and recorded. This mass analysis was particularly useful to establish basic distinctions between debitage items on the basis of shape and size. It also provided the initial data required to monitor the composition of the assemblage for the purpose of accessing transformations of the archaeological contexts as part of post depositional site formation processes. The second stage of the lithic analysis was based around a joint techno-typological approach, which used a basic typological classification for cores, core trimming elements and retouched pieces, as well as an attribute and variable based system to record variability within and across the spectrum. In comparison to other systems employed in the Epipalaeolithic of the Levant (e.g. Edwards 1987; Fellner 1995a; Goring-Morris 1987; Henry 1995) it was felt that this system was comprehensive and detailed enough. All cores, retouched pieces and complete core trimming elements were studied in detail in a second stage of analysis.

Random samples of debitage from each excavation area and context were selected to collect further technological data on the assemblages. With respect to cores and core trimming elements a basic typological list was used to provide an initial overview of the variability within these groups. A more detailed type list was used for retouched items, although this was boiled down from other more extensive type lists commonly used in the Epipalaeolithic of the Levant (Bar-Yosef 1970; Goring-Morris 1987; Hours 1974). However, additional recording fields using two common Epipalaeolithic type lists were employed to facilitate comparability. The second stage of analysis concentrated, however, on recording a number of technological attributes. These were particularly elaborate in the case of retouched items, where a modified version of the Wembach module (Baird et al. 1995) was employed to provide an attribute based system to record the distribution, type and shape of retouched edges. The attribute system combined with a watered down typological categorization provided an ample means to record technological data. This data can then be related to the *châine opératoire*. Definitions of the analytical categories, attributes and variables can be found in Appendix II.

CONCLUSION

In this chapter I have provided an outline of how we might link the epistemological framework outlined in chapter 3 with a comprehensive set of methods. None of the methods put forward here are revolutionary or new to archaeology, but have been tried and tested by various practioneers. I have outlined how an archaeology of inhabitation operates as part of an engagement with agency and practice theory, and how we can link the study of landscapes into our existing methods. The methods used here draw on standard excavation and survey techniques. I have emphasized the importance of considering natural transformations to archaeological sites and assemblages as important factors, and have suggested that they do not stand in opposition to an understanding of the cultural aspects of these archaeological signatures. Natural transformations of archaeological contexts do take place, and archaeologists have equipped themselves well with methods to monitor, assess and filter them out. The basis for the lithic analysis carried out as part of this research is the *châine opératoire* concept. I have discussed this idea in detail and have shown that it provides a strong link between the practice theory framework outlined before and a heuristic, empirical approach to material culture. Using these techniques and methods it is argued that we can now engage in a comprehensive study and analysis of the Epipalaeolithic in the Azraq Basin.

Chapter 5:
The Azraq Basin:
Geography, History of Research and Palaeoenvironment

"*It was to be Ali's first view of Azrak, and we hurried up the stony ridge in high excitement, talking of the wars and songs and passions of the early shepherd kings, with names like music, who had loved this place; and of the Roman legionaries who languished here as garrison in yet earlier times. Then the blue fort on its rock above the rustling palms, with the fresh meadows and shining springs of water, broke on our sight. Of Azrak, as of Rumm, one said 'NUMEN INEST'. Both were magically haunted: but whereas Rumm was vast and echoing and God-like, Azrak's unfathomable silence was steeped in knowledge of wandering poets, champions, lost kingdoms, all the crime and chivalry and dead magnificence of Hira and Ghassan. Each stone or blade of it was radiant with half-memory of the luminous, silky Eden, which had passed so long ago*."

T.E. Lawrence, *The Seven Pillars of Wisdom* (p. 321)

INTRODUCTION

Driving on the pothole scarred road that leads from Amman to Azraq today is an experience unlike many others. Leaving the chaotic, sprawling, ram-shackled suburbs of Amman behind, one enters the open and seemingly endless semi arid steppe that characterises much of this part of the Transjordanian plateau. This is not a dramatic landscape dominated by spectacular cliffs or deeply incised wadis, like much of the rest of Jordan, but it is dramatic in terms of its seeming emptiness. Limestone hills give way to expansive flint-strewn plains (Figures 5.1, 5.2), periodically dotted with modest hillocks or small meandering wadis surrounded by mudflats. It is a remarkably mundane, almost desolate experience until the last crest east of the Wadi Butum is negotiated all the way to the top. Here, faintly shimmering in the distance the shape of the Azraq Oasis can be glimpsed, nestled within a natural, broad basin which, at just over 500 meters above sea level, represents the lowest part of the Azraq Basin (Figure 5.3). The palm trees of the oasis faintly visible against the horizon promise water and wildlife. Against the backdrop of steeply rising basalt mountains that dot the northern and northeastern horizon, the oasis appears like a safe-haven, a place of rest and rejuvenation. At the Amman-Zerqa-Azraq interchange, the traffic is suddenly dominated by long queues of tanker trucks and suburban 4-whell drive vehicles coming from or going to the Saudi Arabian border a mere 70 km to the south. Today, as in the past, the oasis is a focal point of local patterns of movement.

Figure 5.1: The modern landscape in the Wadi el-Jilat

Figure 5.2: A view of the Azraq Oasis in the distance. Taken from Jebel Usseikhin, looking South.

Clearly, the semi-arid to arid landscape of the Azraq Basin today is only a very faint approximation of how it was in the past. In this chapter, I provide a short and comprehensive summary of the history of archaeological research in the Azraq Basin, an overview of the Epipalaeolithic sites and sequences in the area, as well as a discussion of the available data from palaeoenvironmental and climatic studies. Approximately thirty years of research have produced a fairly detailed picture of the final Pleistocene occupation the Azraq Basin. A total of fourteen final Pleistocene sites covering all the chronological horizons of the Epipalaeolithic have been excavated to-date, while many further lithic scatters are known (Garrard, Baird & Byrd 1994: 189-193; Figure 5.4). In contrast to much of the Sinai and Negev (Goring-Morris 1987; Marks 1977), the Azraq Basin has also produced evidence for early Epipalaeolithic occupations, despite the prediction that hyper-arid conditions existed in this region during the Last Glacial Maximum (see below). The Azraq Basin is not only one of the more intensively studied and, arguably, better understood regions of the southern Levant, but it has also produced evidence of a number of unusually large and dense Epipalaeolithic occupations. The Azraq region is thus of pivotal importance to understanding the final Pleistocene sequence in Southwest Asia and it is against this background that the research at Ayn Qasiyya and AWS 48 presented in this thesis.

Figure 5.3: The modern Azraq Oasis. View of the re-flooded and artificially maintained wetlands inside the Azraq Wetlands Reserve.

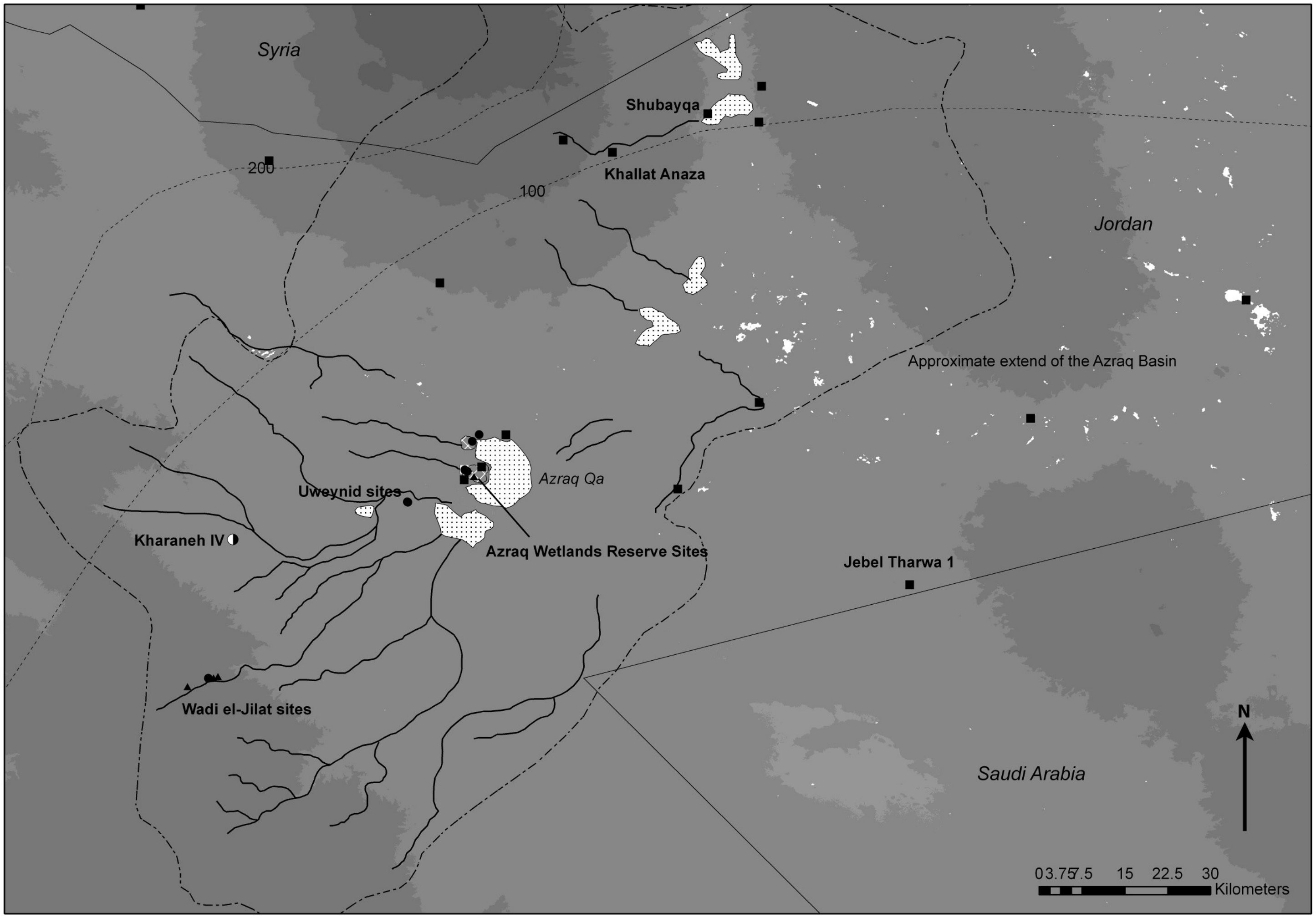


Figure 5.4: The Azraq Basin showing the distribution of the major known Epipalaeolithic sites (Circle: Early Epipalaeolithic; Triangle: Middle Epipalaeolithic; Square: Late Epipalaeolithic; Half circle: Early & Middle Epipalaeolithic), as well as major wadis, mudflats, and mean annual precipitation (dotted line).

HISTORY OF RESEARCH

Initial research in the Azraq area was sporadic and short lived. In comparison to Europe prehistoric research in Southwest Asia only began in earnest in the 1920s. Many scholars consider Turville-Petre and Keith's (Turville-Petre & Keith 1927) work in the Galilee as a starting point of prehistoric research in the region, followed shortly after by Dorothy Garrod's first major excavation at the cave site of Wadi en-Natuf (1932; Garrod & Bate 1937). Much of the research in these early days was concentrated to the west where cave sites tempted prehistorians with deep stratigraphic sequences that might detail the evolution of human societies in the Levant over long periods of time (Rosen 1991). The more inaccessible semi-arid to arid regions of Transjordan were consequently seen only as marginal areas of lesser interest to archaeologists. Nevertheless, unsystematic surveys of the eastern Transjordanian desert were carried out as early as the late 1920s, which resulted in the sporadic discovery of prehistoric sites. Field (Field 1960), accompanying a British military patrol along the Amman-Baghdad postal route during the Mandate Era, collected some flaked stone artefacts and reported the presence of a number of potential sites. Following this early work John Waechter and V.M. Seton Williams set out to conduct fieldwork in the Wadi Dhobai in the southeastern part of the Azraq Basin in 1937 and 1938 (Waechter et al. 1938). They carried out an intensive survey of the wadi and conducted text excavations at two sites. The survey and test excavations recovered Neolithic chipped stones from sites with architectural remains extant on the surface. Waechter et al. (1938) labelled the lithic industry the Dhobaian, but they have since been labelled are Pre-Pottery Neolithic B (Garrard et al. 1988; Garrard et al. 1977). In addition, test excavations also revealed a final Pleistocene industry at site K, which Waechter et al. (1938) identified as early Epipalaeolithic. Given the accepted nomenclature at the time, he labelled it as Kebaran. Following survey of prehistoric sites across Transjordan conducted by Zeuner et al. (1957) further Palaeolithic sites were identified in the Azraq region, especially in the Azraq Oasis. Kirkbride conducted a brief test excavation at the Lower Palaeolithic sites of Lion Spring and the Middle Palaeolithic site at C spring (or Ain al-Assad) in the southern part of the Azraq Oasis (Harding 1958, 1959). Following this initial work, which demonstrated the presence of a number of prehistoric sites in the area, no fieldwork targeting prehistoric sites was conducted in the basin until the mid-1970s.

In 1975 Garrard and Price conducted a preliminary survey of the Azraq Basin during which they recorded more than fifty prehistoric sites in the Azraq Oasis, the Wadi Uweynid, and Wadi Kharaneh (Garrard et al. 1977). This reinforced the potential this area seemed to have to conduct more detailed studies of prehistoric settlement patterns and resulted in the initiation of a major long term field project in the Azraq Basin. The Azraq Basin Early Prehistory Project, directed by Andrew Garrard, ran from 1982 until the early 1990s (Garrard, Byrd et al. 1985; Garrard 1984; Garrard 1991; Garrard 1998; Garrard, Baird & Byrd 1994; Garrard, Baird, Colledge et al. 1994; Garrard et al. 1987; Garrard et al. 1988; Garrard et al. 1996; Garrard, Harvey et al. 1985) and focussed on the western part of the basin and the oasis. It was specifically concerned with investigating final Pleistocene and early Holocene sites in order to study the transition from hunting and gathering to the development of the Neolithic in this semi-arid to arid region (in the course of the fieldwork one Lower Palaeolithic site, C spring, was also investigated). In the survey stage of the project a number of key final Pleistocene and early Holocene sites were located in the Oasis and the Wadi Uweynid. The project also re-visited the Wadi el-Jilat, an area Waechter et al. (1938) had referred to as the Wadi Dhobai (Garrard, Byrd et al. 1985). Excavations were conducted at ten final Pleistocene sites, dating from the late Upper Palaeolithic and through to the Late Epipalaeolithic. In addition eight Pre-Pottery Neolithic and Pottery Neolithic sites were also excavated. This research made the most critical contribution to our understanding of the prehistoric occupation of the Azraq Basin to-date, since it not only recovered abundant archaeological data from material culture to faunal and botanical remains, but also incorporated a significant geoarchaeological component that provided vital information on the palaeoenvironmental conditions in the region between the last Glacial Maximum and the early Holocene (Garrard 1998).

In addition to the Azraq Basin Early Prehistory Project, a number of other field investigations began in the early 1980s. Rollefson (1983) excavated the Lower Palaeolithic site of Ain al-Assad (Lion Spring) in the southern part of the Azraq Oasis, soon followed by Hours and Copeland's more wide-ranging study of Lower Palaeolithic surfaces across the Azraq Basin (Copeland & Hours 1989). In addition, Alison Betts undertook survey and limited excavation at a number of Late Epipalaeolithic and Pre-Pottery Neolithic sites along the northern and eastern periphery of the basin, as well as into the basalt deserts beyond (Betts 1988, 1991, 1998). Also in 1981, Mujaheed Muheisen conducted a first season of excavations at Kharaneh IV revealing a long sequence of Epipalaeolithic occupations at the site (Muheisen 1988a, b, c). The initial season was followed by further excavations in 1985. This work demonstrate the presence of early and middle Epipalaeolithic deposits at the site, characterised by a high abundance of lithic artefacts, some ground stone artefacts, living floors, as well as human remains. These projects broadened our picture of the Epipalaeolithic occupation of the Azraq Basin and demonstrated the longevity of occupations in the region throughout much of the Final Pleistocene (Byrd & Garrard 1989; Garrard & Byrd 1992).

During the late 1990s Rollefson, Quintero and Wilke (Rollefson et al. 1997) worked at Ain Soda, the larger of two springs in the southern part of the Azraq Oasis, to study exposed prehistoric deposits in this area. Initial fieldwork confirmed the presence of Acheulean, Middle Palaeolithic and Epipalaeolithic deposits near the former spring, some of which had been damaged by ongoing restoration works in the recently-founded Azraq Wetlands Reserve. This initial fieldwork was followed by test excavations at the lower Palaeolithic and Epipalaeolithic localities, which revealed a rich Acheulean lithic and faunal assemblage, as well as a likely Early Epipalaeolithic industry (Rollefson, Quintero and Wilke, pers. comment)[5]. Rollefson, Quintero and Wilke also carried out small-scale excavations at the late Epipalaeolithic and Pre-Pottery Neolithic B site of Bawwab al-Ghazal, situated along the eastern edge of the former wetland in southern Azraq (Rollefson et al. 1999; Rollefson et al. 1997). In 2000, Rollefson, Quintero and Wilke carried out a detailed surface survey of the Azraq Wetlands Reserve, to provide a Cultural Resource Management database for the Royal Society for the Conservation of Nature (Rollefson et al. 2001, see chapter 6). This survey resulted in the discovery and mapping of more than 60 Epipalaeolithic sites and findspots, ranging in size from isolated finds to extensive lithic scatters (AWS 48, for example, is 14,000 m^2 in extent). Ayn Qasiyya and AWS 48, the sites comprising the primary case studies of the present thesis, were found during this survey (Figure 5.5). Concerns for the continued preservation of Ayn Qasiyya in particular, brought about by the rapid depletion of the natural groundwater in the area due to the modern water extraction, stimulated the initiation of salvage fieldwork at this site by the author in 2005, following a suggestion by Quintero, Wilke and Rollefson.

THE FINAL PLEISTOCENE SEQUENCE IN THE AZRAQ BASIN

Fieldwork throughout the Azraq Basin has produced comprehensive datasets for the final Pleistocene human occupation of the region. Although surveys have only covered selected portions of the basin intensively, and excavations have predominantly concentrated on sondages of limited horizontal extent at key sites, the evidence clearly indicates that the Epipalaeolithic occupation in the region was at times intense and seemingly continuous. The following section briefly summarises the final Pleistocene sequence in the Azraq Basin and presents a concise summary of the main sites, industries and associated material evidence.

5: Since this assemblage is as yet unpublished, I examined it during a study trip to the University of California, Riverside in March 2008. Unfortunately, the assemblage contains few microliths, none of which are diagnostic. Cores consist of single-platform bladelet cores, which are reminiscent of the Ayn Qasiyya assemblage, particularly Areas A/B. The raw material is also very similar to the Ayn Qasiyya Area A/B assemblages. It seems likely that this is an Early Epipalaeolithic assemblage.

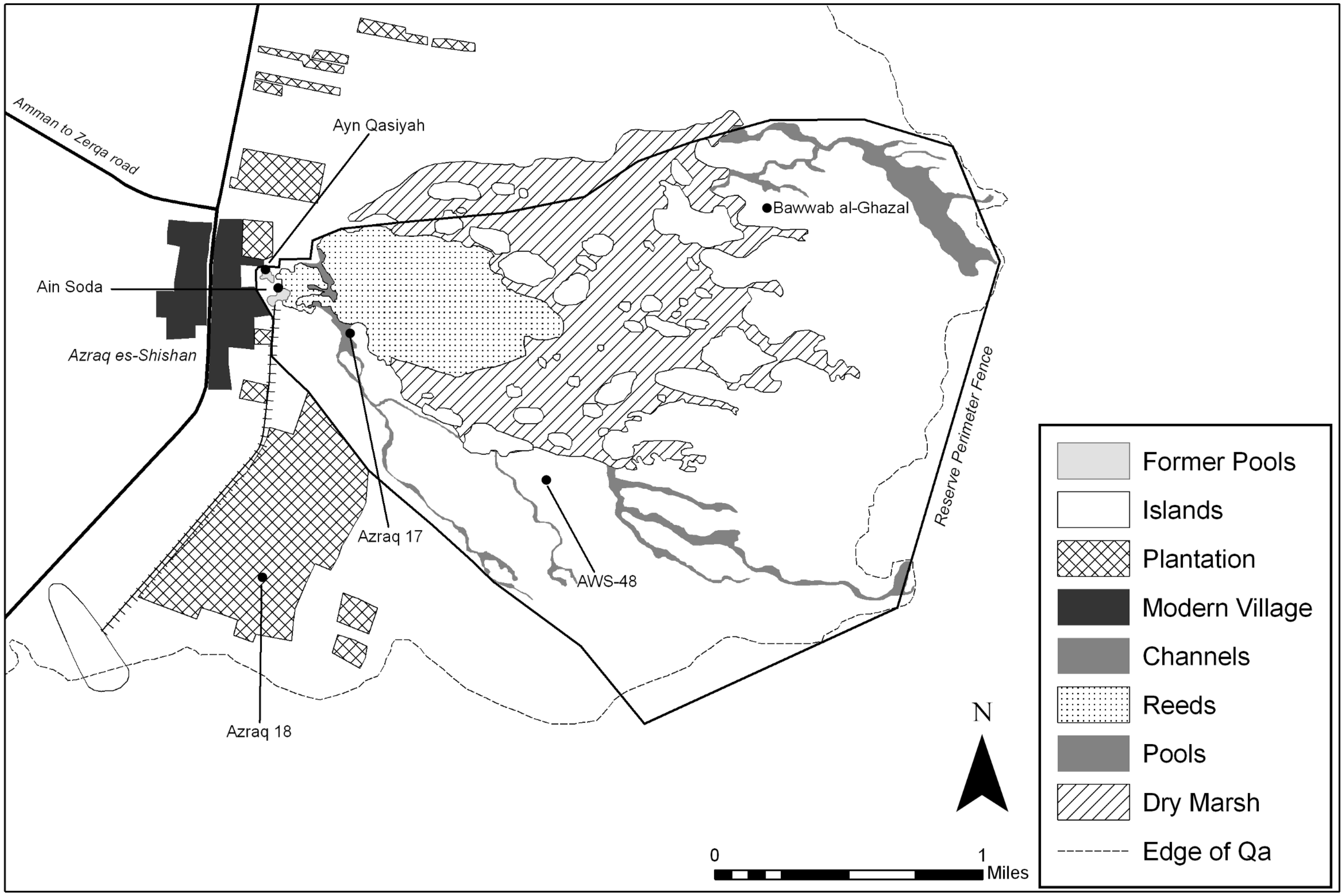


Figure 5.5: Map of Azraq es-Shishan (South Azraq), showing the location of major Epipalaeolithic sites, and the extent of the Azraq Wetlands Reserve.

Since the transition from the late Upper Palaeolithic to the early Epipalaeolithic in the southern Levant remains somewhat poorly defined, owing to the sparseness of secure radiocarbon dates (Baird et al. 1995; Byrd 1998; Byrd 1994b; Goring-Morris 1995) and the somewhat fuzzy resolution offered by the study of lithic assemblages dating from the Upper to Epipalaeolithic transition (Copeland 2003; Gilead 1984, 1988, 1991; Nadel 2002; Nadel 2003), the evidence for late Upper Palaeolithic sites in the Azraq Basin shall be briefly discussed here. With the recognition of the Ahmarian as a distinct archaeological entity it is now well-established that the occurrence of bladelet-based assemblages and the appearance of microliths pre-dates the Early Epipalaeolithic (Bergman & Goring-Morris 1987; Gilead 1984, 1988, 1991; Goring-Morris 1980a; Goring-Morris 1980b; Marks 1977, 1981a, b). With the Masraqan, Goring-Morris (1995) introduced a transitional terminal Upper Palaeolithic/early Epipalaeolithic industry, which is considered to be an extension of or partially coeval with the later Ahmarian. Sites which could be described as late and terminal Upper Palaeolithic in the Azraq Basin include Azraq 17 Trench 2, Jilat 9 and perhaps Uweynid 18 lower phase. Azraq 17 is a site situated in the southern part of the Azraq Oasis, in close proximity to the springs at Ayn Soda and Ayn Qasiyya (see Figure 5.5). Trench 2 at Azraq 17 produced a largely microlithic chipped stone industry with marginally retouched, thin bladelets, as well as some macrolithic pieces including scrapers, burins and non-formal retouched pieces (Garrard et al. 1994: 192). Wood charcoal from this trench produced a date of 16,354-15,129 cal B.P. (Figure 5.6; Table 5.1), which might be considered too young in the light of the microlith assemblage. Jilat 9, situated within the upper reaches of the Wadi el-Jilat ca. 60 km southwest of the Azraq Oasis, produced a lithic assemblage that contained a restricted number of microliths (5% of the total retouched tool class), but is dominated by a macrolithic component of blade-based scrapers, retouched pieces and notches. One AMS date on a piece of burnt bone produced a date of 25,206-24,995 cal B.P. (OxA 519, Garrard, Baird & Byrd 1994: 189). The Uweynid 18 lower phase lithic assemblage was extremely sparse and associated with a hearth. One AMS date from this phase (OxA-867) on wood charcoal produced a date of 23,320-23,080 cal B.P. which also indicates a late Upper Palaeolithic affinity. While the chipped stone assemblage from Azraq 17 can be tentatively assigned to the Masraqan (Goring-Morris 1995) those from Uweynid 18 lower and Jilat 9 are too sparse to allow definitive judgements about their typological association. Other datasets from these sites are very sparse. Faunal remains indicate the likely hunting of wild ass, gazelle and hare. Jilat 9 also produced a large collection of tortoise carapaces, which were largely fragmentary (Byrd and Garrard 1989: 86; Garrard et al. 1988).

In comparison to the Upper Palaeolithic, significantly more sites from the Epipalaeolithic period are known from the basin, including sites with substantial and continu-

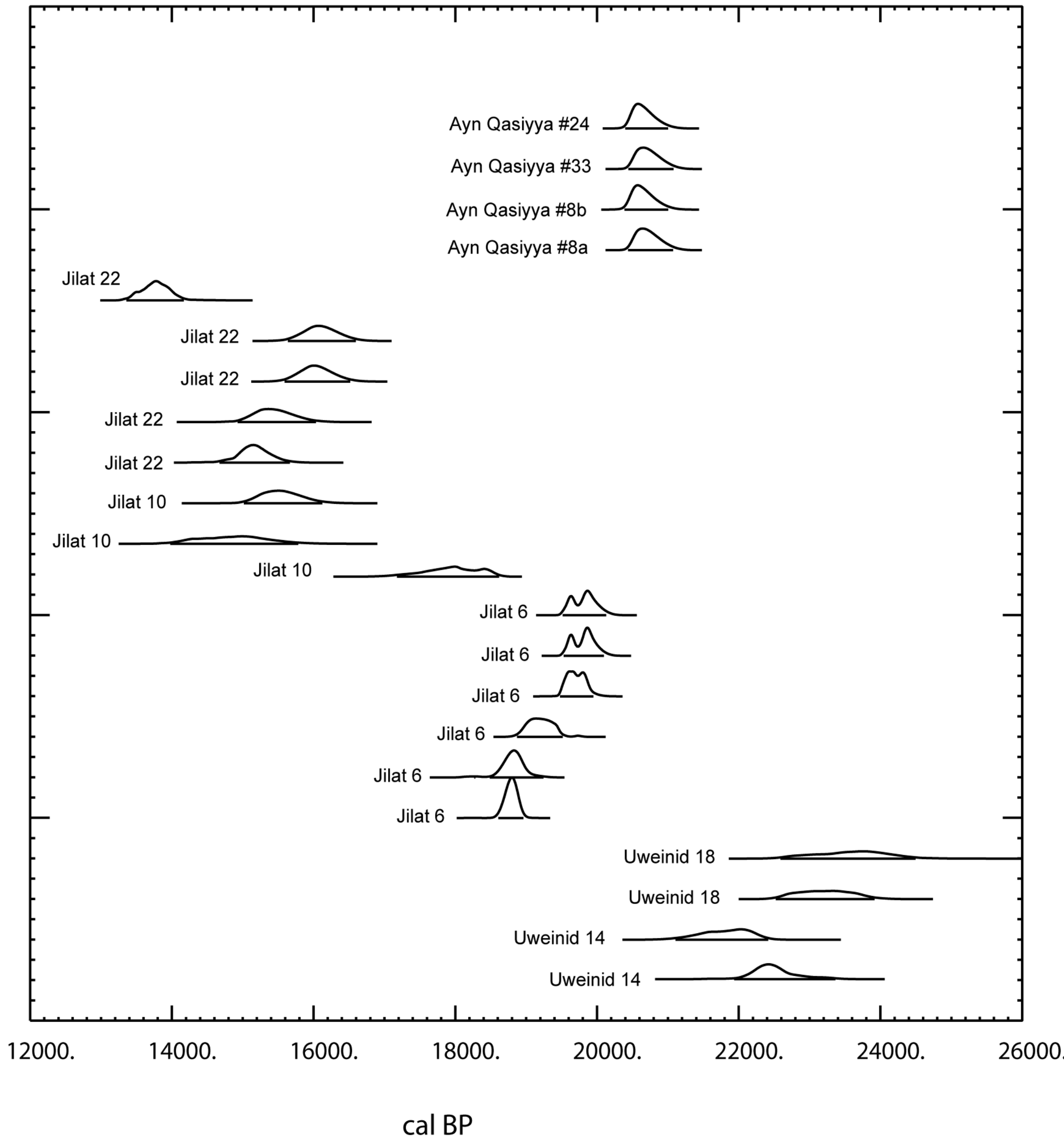


Figure 5.6: Graph showing the 98% distribution of Epipalaeolithic C14 dates from the Azraq Basin (all dates calibrated using Calib 5.1.0 and INTCal04)

ous stratigraphic sequences. Epipalaeolithic chipped stone assemblages in the basin as elsewhere are signified by a clear dominance of bladelet blanks and microliths in the retouched artefact class. Early Epipalaeolithic sites can be found in the Wadi el-Jilat, the Wadi Uweynid, the Wadi el-Kharaneh and, of course, in the Azraq Oasis (e.g., Ayn Qasiyya). Many sites contain several phases dating to the early Epipalaeolithic, including Kharaneh IV, Uweynid 14 & 18, and Jilat 6 (Byrd 1988; Byrd and Garrard 1989; Garrard and Byrd 1992; Garrard et al. 1988; Garrard, Baird & Byrd 1994; Garrard 1998; Muheisen 1988a, 1988b). The site of Kharaneh IV, first excavated by Mujaheed Muheisen during the 1980s (Muheisen 1988a, 1988b, 1988c, Muheisen and Wada 1995) is situated 36 km east of the Azraq Oasis within an alluvial fan that forms part of the Wadi Kharaneh (Figure 5.4). Covering ca. 20,000 m^2 the site is among the largest early prehistoric open-air occupations in Southwest Asia and rises ca. 3 m above the surrounding wadi floor (Figure 5.7, 5.8, 5.9). Kharaneh IV appears to have three early Epipalaeolithic phases associated with layers A, B and C. The basal layer Phase A is associated with a bladelet-orientated industry fashioned from predominantly single-platform cores, while the retouched component is dominated by microliths (Figure 5.10). The retouched microlithic assemblage is dominated by bladelets with partial or complete fine retouch. A further common type are microgravettes with bipolar retouch, while obliquely truncated and backed bladelets are absent in phase A (Muheisen 1988a, d). Amongst the macro-lithic pieces scrapers were common, although burins, retouched flakes and blades, truncations and notches/ denticulates were also found. The considerable amount of faunal material from this phase produced evidence for equids, gazelle, tortoise, and hare amongst other species. The material was recovered from a 30-70 cm thick deposit that consisted of clay-rich deposits with carbonate concretions and ashy lenses. Muheisen (1988a: 353) also reported the presence of a hearth and some groundstone.

Phase B at Kharaneh IV directly overlies Phase A, and has an average thickness of 45 cm. Muheisen describes this as consisting of clayey silt deposits with ash and carbonate inclusions. Within this phase the complete and partial remains of two individuals were found, representing rare instances of early Epipalaeolithic human burials. The complete skeleton was found in supine, extended position with two medium-sized rocks placed over its head and legs (Muheisen 1988a: 358). Two gazelle horn cores were found in association with the cranium, but it is unclear from published reports whether they were part of the burial or not. The second, partial skeleton was found alongside the complete skeleton, but Muheisen does not relate the state of articulation. Both appear to have been buried directly beneath a living floor or occupation surface. This living floor was associated with a hearth and dense concentrations of animal bones and chipped stone. The chipped stone assemblage from Phase B consists largely of microliths. Non-geometric microliths dominate and among these obliquely truncated and backed bladelets with fine retouch and narrow pointed bladelets, also with fine retouch, are the most common. Scrapers and burins were particularly frequent amongst the macro-lithic tool class, while retouched blades, notches, denticulates and multi-tools were also found. Narrow-faced, nosed or crested bladelet cores appear to have been quite diagnostic of the bladelet reduction sequence in Phase B, since they are absent from other phases at Kharaneh IV.

A living floor and ca. 30 cm thick loess-like deposit with chipped stone and faunal

Figure 5.7: The Early Epipalaeolithic site of Kharaneh IV during survey work in July 2006. The settlement mound is in the middle distance surrounded by concrete posts. Qasr Kharaneh can be seen in the background

Figure 5.8: Kharaneh IV. View from the top of the site looking East.

Figure 5.9: Kharaneh IV detail of deflated surface of the site showing typical density of lithic artefacts.

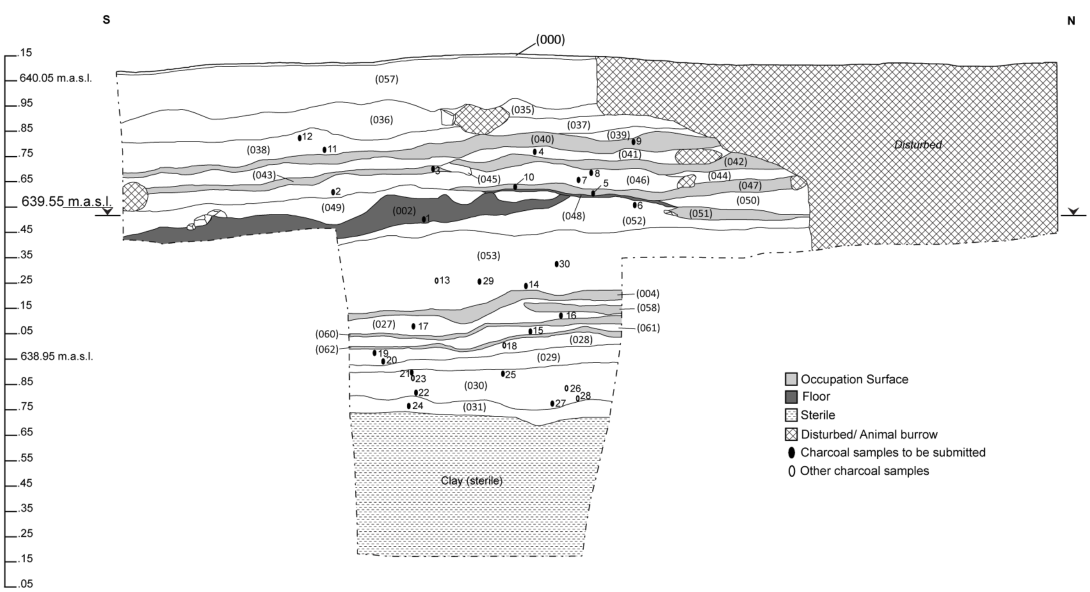


Figure 5.10: The stratigraphic sequence from the early Kebaran to the Nizzanian at Kharaneh IV. Western section in Area B following excavations by the *Epipalaeolithic Foragers in Azraq Project* in June 2008 (courtesy of the *Epipalaeolithic Foragers in Azraq Project*).

remains characterise Phase C. Within this phase a rectangular hearth was found, associated with abundant ash. Once again, the microlithic retouched component is non-geometric and includes backed and truncated bladelets with abrupt retouch, and truncated bladelets. Some geometric microliths represented by backed trapezes occur; but are rare. As in phase B, endscrapers are common, but retouched blades and flakes are also fairly well represented (Muheisen 1988: 358). The last phase at Kharaneh IV (Phase D) is characterised by a subtle shift in settlement location. While Phases A, B, and C are superimposed, forming a 1.5 m thick settlement mound that stands at its top ca. 2.8m above the surrounding wadi floor (Figure 5.10), Phase D is documented only on the southwestern part of the site. It consists of a separate mound that partially overlies the lower sides of the main occupation area, but is ca. 1 m lower than the top of the main mound (see Muheisen 1988a, 355, figure 2). Muheisen has reported to have excavated ca. 30-40 cm of deposits belonging to this phase, which contained evidence of a living floor, several hearths, and post holes. The latter suggested the remains of a possible structure, although neither detailed descriptions nor a plan have been published. The chipped stone industry is once again clearly of an Epipalaeolithic character. The production of blades/ bladelets dominates, with cores often displaying alternating or opposed platforms. Geometric microliths dominate the retouched microlith assemblage and amongst these trapeze/rectangles are most common. Their presence firmly places the Phase D assemblage within the Middle Epipalaeolithic. Muheisen (Muheisen 1988a; Muheisen 1995) has documented a considerable degree of variability amongst these trapeze/rectangles, particularly concerning the distal and proximal retouch. Variations include straight, obliquely truncated or obliquely convex truncated ends fashioned by oblique retouch. This level of variation is largely undocumented at other Geometric Kebaran sites (Goring-Morris 1995). With four phases of occupation, Kharaneh IV is one of the most substantial early to middle Epipalaeolithic open air sites in Southwest Asia. Radiocarbon dates obtained from the site are widely viewed as being unreliable. This is because there are no contextual information indicating where they were sampled from, and because the dates obtained from Phase B appear somewhat too young and those from Phase D too old when compared with other Early and Middle Epipalaeolithic dates obtained elsewhere. The site's occupation does appear to be characterised by a high degree of continuity, since there are no sterile deposits or visible interruptions in any of the exposed section profiles. Phase A can thus be associated with early Kebaran assemblages known from the western Levant, while Phase B appears to correspond well with late Kebaran assemblages (Bar-Yosef & Vogel 1987; Goring-Morris 1995; Muheisen 1988a). Goring Morris (1995:155) has suggested that Phase C can be assigned to the Nizzanian industry, while Phase D clearly forms part of the Geometric Kebaran complex.

A comparable, yet subtly different, sequence has been documented at the similarly large site Jilat 6, situated in the Wadi el-Jilat ca. 65 km southwest of the Azraq Oasis (Byrd 1988; Figure 5.11; Byrd & Garrard 1989; Garrard, Byrd et al. 1985; Garrard 1984; Garrard 1991; Garrard 1998; Garrard, Baird & Byrd 1994; Garrard, Baird, Colledge et al. 1994; Garrard et al. 1987; Garrard et al. 1988; Garrard & Byrd 1992; Garrard et al. 1996). The site produced evidence for three phases of occupation, referred to as lower, middle and upper phase. Like Kharaneh IV, the site is characterised by a considerable thickness of deposits, which reach a height of ca. 2 m above the surrounding alluvial fan. With 17,500 m^2 the site is only marginally smaller in surface extent, although similar to Kharaneh IV, it seems that the current size of the site is partially a result of deflation. The lowest phase consists of a substantial aeolian silt deposit, almost one meter thick, with evidence for the subsequent palaeosol development (Garrard, Baird & Byrd 1994: 190-191). The upper part of this stratigraphic unit contained a microlithic chipped stone assemblage, as well as faunal remains of gazelle, equids, and tortoise. The microlith assemblage is dominated by non-geometric pieces amongst which arch backed and curved pointed bladelets dominate (Byrd 1988: 259-260). These are predominantly narrow and characterized by fine retouch. The microburin technique was used habitually to section bladelets for microlith production. Other chipped stone tools are mainly truncations and retouched flakes and blades. One radiocarbon date obtained from this phase is considered unreliable, due to the fact that it pre-dates material from the upper phase by almost 8,000 years (Garrard, Baird & Byrd 1994: 190-191). The middle phase of Jilat 6 is comprised of a 40-55 cm-thick deposit composed of aeolian silts which display evidence for weak pedogenesis. Within this deposit a 5-7 cm thick occupation surface was recognised. The chipped stone assemblage is overwhelmingly microlithic and La Mouillah points are commonly found. Double truncated and backed bladelets and Qalkhan points are also present. Given the tool inventory the microburin technique was commonly used for the sectioning of bladelets. Macrolithic tools include notches and denticulates, as well as more informally retouched flakes and blades. Shell beads and bone tools were also found in this phase, while faunal remains reflect the hunting of gazelle, equus and tortoise. Two radiocarbon dates obtained from this phase are once again considerably younger than dates from the upper phase and do not fit with the typological characteristics of the chipped stone assemblage. They are therefore considered to be contaminated and too young (ibid.). The upper phase of Jilat 6 consists of a 40-60 cm-thick horizon of ashy silts which contain dense concentrations of lithics and fauna. In the lower 30 cm of this deposit several occupation surfaces were recognised, as well as layers of compressed silt and horizontal ochre-stained surfaces. The latter have been interpreted by the excavators as the floors of hut structures, since in both cases the floors appear to be lipped up form-

Figure 5.11: View of Wadi el-Jilat 6, with Andrew Garrard and Corinne Yazbeck standing on top of the site and the vehicle at its base.

Figure 5.12: View of surface at Uweynid 18

ing the edge of the floor. The flint industry in this phase is once again dominated by microliths, the retouched component of which is characterised by abundant asymmetric and symmetric triangles. Microgravette points, curved pointed and backed and arch backed bladelets also occur. The use of the microburin technique is once again commonly attested in this assemblage. Non-microlithic tools include endscrapers, burins, and various simple retouched tools. Two fragmentary ground stone tools made from basalt, as well as an incised pebble were also found. Similar to the middle phase, shell beads and bone tools occur. Although the faunal spectrum is generally diverse and includes numerous bird species, gazelle is nevertheless the dominant animal. Extensive flotation work recovered a number of *Chenopods*, and evidence for other taxa including *Stipa, Atriplex,* and *Verbascum*. Colledge has argued that the presence of sedges in the sample suggests that water was present in the vicinity (Colledge 2001: 144). Six C14 dates from wood charcoal have been obtained from this phase, which cluster around 16,700 to 15,470 cal B.P. (Garrard, Baird & Byrd 1994: 190; Figures 5.6; Table 5.1). These appear fitting with the typological characteristics of the chipped stone industry, and generally fall into the later Early Epipalaeolithic and early Middle Epipalaeolithic.

In addition to the lower and middle phase at Jilat 6 and Phases A and B at Kharaneh IV two other major early Epipalaeolithic sites have been investigated in the Wadi Uweynid ca. 10 km southeast of the Azraq Oasis. Uweynid 14 and Uweynid 18 are situated next to each other on a terrace to the south of the Wadi Uweynid, and are today separated by an erosional gully (Garrard et al. 1988; Garrard, Baird & Byrd 1994: 189 190; Figure 5.12). In the past the two sites were probably part of one larger site. Uweynid 18 contains two occupational phases, while three occupational phases have been distinguished at Uweynid 14. The upper phase at Uweynid 18 consists of 15 cm of aeolian silts which contain evidence for pedogenesis and a later carbonate induration. The microlithic assemblage is dominated by narrow, finely-made curved backed and pointed bladelets and arch backed bladelets commonly produced using the microburin technique. Dentalium shell beads and basalt groundstone tools were also found in this phase, as well as fragments of two pestles. Gazelle, equids and tortoise dominate the faunal spectrum. This phase produced two AMS dates on wood charcoal of 22,416-21,108 cal B.P. and 23,364-21,935 cal B.P. (Garrard, Baird & Byrd 1994: 189). The lower phase at Uweynid 18 consists of aeolian silts and a hearth in which burnt basalt pebbles were found. Very few chipped stone artefacts and no other finds were recovered from this phase.

The upper phase at Uweynid 14 consists of a very thin horizon, 2 cm in thickness, which contains abundant chipped stone artefacts, but rare faunal remains (Garrard, Baird & Byrd 1994: 189). The microlithic tools in this phase are comprised of La Mouillah points and double truncated and backed bladelets, while the microburin technique is again a common feature. One AMS date on wood charcoal from this phase produced the date 22,416-21,108 cal B.P. (Garrard, Baird and Byrd 1994). The lower phase of Uweynid 14 consists of a thin cluster of artefacts 2 cm in thickness, contained in clayey silts, which also contains sparse faunal remains and charcoal. It is separated from the upper phase by a 15-20 cm-thick sterile layer. The retouched tool component of this phase is dominated by narrow, finely-made arch backed and curved pointed and backed bladelets, which were made using the microburin technique. This assemblage is very similar in appearance to both Uweynid 18's upper phase and the lower phase at Jilat 6. Wood charcoal recovered from this phase was AMS dated to 22,200-21,400 cal B.P., but may be considered intrusive from the upper phase.

It is apparent that Early Epipalaeolithic sites in the Azraq Basin fall into two groups of lithic industries: the Kebaran and the Nebekian. Phases A and B at Kharaneh IV have produced assemblages that have clear commonalities with the Early Epipalaeolithic assemblages from the western Levant, which are generally subsumed under the Kebaran industry or complex (Bar-Yosef 1970, 1981, 1987b; Bar-Yosef & Vogel 1987; Goring-Morris 1980a). Phase A relates to the early Kebaran, while phase B would appear to relate to the late Kebaran, although this typological distinction is somewhat problematic and may be equivocal on a wider pan-Levantine scale (Hovers & Marder 1991). Phase B, in particular, appears quite similar to other Kebaran style assemblages from the Jordan Valley amongst which the microlithic tools are often dominated by obliquely truncated and backed bladelets at the expense of other tool types. Edwards (Edwards 1996: 123-126; 2001: 91) has suggested that this may constitute an East Jordan Valley variant of the Kebaran. In contrast to these assemblages, Jilat 6 lower and middle phase, Uweynid 18 upper, and Uweynid 14 upper and middle phase differ from Kharaneh IV and other Kebaran style assemblages, both typologically and in certain technologically aspects (Byrd 1998; Henry 1995). While the microburin technique is absent from Kebaran assemblages, it is documented at a very early date in the Azraq Basin. Early Epipalaeolithic assemblages from Jilat 6 and the Uweynid sites are very similar to the final Pleistocene chipped stone industries excavated at Yabrud III (Rust 1950), as well as sites in Southern Jordan (Henry 1995; Olszewski 2001b, 2006). Although Henry suggested that these assemblages should be labelled as the Qalkhan and Madamaghan industries, it is now more generally agreed that they represent the classic Nebekian industry as defined by Rust (Olszewski 2006; Rust 1950). The most distinct characteristic is the habitual use of the microburin technique amongst Nebekian assemblages, as well as the predominance of narrow, finely-made arch backed and curved pointed and backed bladelets, and then La Mouillah points and double truncated and backed bladelets in later phases. Early Epipalaeolithic assemblages can, on the broadest level, therefore be divided into two contemporary lithic industries: those which are microburin-poor (Kebaran) and those that are microburin-rich (Nebekian). Geographically, these show a clear spatial distribution with the former assemblages clearly predominating in the western Levant and the latter in the eastern Levant (Stutz & Estabrook 2004). It appears that the Azraq Basin is one of the few locations where both industries share the same geographical space.

In addition to the upper phase of Jilat 6 and Phase D at Kharaneh IV (discussed above) four further post-Early Epipalaeolithic sites have been investigated in the Azraq Basin. All are located in the Wadi el-Jilat and were excavated as part of the Azraq Basin Early Prehistory Project (Garrard et al. 1988; Garrard, Baird & Byrd 1994, Garrard 1998). Jilat 22 is a fairly extensive site covering 3500 m^2 which contains three occupational phases. The lower phase is poorly defined since its deposits were very highly cemented and difficult to excavate. The middle phase consists of cemented calcareous silts ca. 30 cm-thick, which contain high densities of artefacts, fauna and charcoal. The lower part of this deposit was characterised as a former marsh deposit on the basis of Phragmites stems and rhizomes found in growing positions. The chipped stone artefact assemblage is somewhat unusual in comparison to other Epipalaeolithic sites in the region. It contains few microlithic tools, which are largely backed bladelet fragments. The major tool group is the so called Jilat Knife, a tanged obliquely truncated pointed blade, which has not been documented at any other site in the southern Levant to date (Garrard 1992). Shell beads were also found in this phase, while the faunal assemblage consists of gazelle and tortoise, in addition to various bird species. Two AMS dates on wood charcoal produced dates of 16,596-15,638 cal B.P.- and 16,518-15,590 cal B.P.- The upper phase is included in ashy silts ca. 20 35 cm in thickness that contain high densities of lithic and faunal remains. The chipped stone assemblage is microlithic in nature, and amongst the retouched microliths trapeze/rectangles, La Mouillah points, triangles, and lunates occur. This is therefore a geometric microlithic assemblage; however, it cannot be clearly assigned to any of the known lithic industries found elsewhere in the southern Levant (Byrd 1998; Byrd 1994; Garrard 1992). Fragments of basalt groundstone tools and shell beads were recovered from this phase. One AMS date on wood charcoal produced a date of 14,169-13,359 cal B.P.

Jilat 10 (Garrard et al. 1988; Garrard, Baird & Byrd 1994) is a single phase site situated in the aeolian silts on the terrace of the Wadi Jilat that also produced an uncharacteristic chipped stone assemblage. The retouched artefacts are dominated by macroliths, amongst which blade-based endscrapers, burins and truncations are common. The few microlithic tools are mainly backed bladelet fragments and thin bladelets with marginal retouch. Some shell beads were recovered and the faunal assemblage attests to the hunting of equids and tortoise. Three AMS dates from the site (two obtained on one sample) produced dates of 15,785-13,978 cal B.P., 16,124-15,017 cal B.P., and 18,618-17,177 cal B.P and suggest a Middle Epipalaeolithic date.

At around 6300 m^2, Jilat 8 is somewhat larger than Jilat 10, and is situated right next to the gorge of the Wadi Jilat (Garrard et al. 1988, Garrard, Baird & Byrd 1994). The archaeological deposit is 40-50 cm thick and consists of aeolian silts with pockets of artefacts and faunal remains. The lithic industry is yet again dominated by microliths. Trapeze/rectangles, La Mouillah points and curved pointed and backed bladelets and arch backed bladelets are common. The microburin technique was used to produce the microliths and, once again, endscrapers are particularly common amongst the macrolithic tools. Two AMS dates were obtained on wood charcoal 16,026-15,548 cal. B.P. and on burned bone 12,794-12,166 cal. B.P. The latter appears considerably younger and is likely inaccurate in comparison to the other date and the lithic assemblage. In addition, some fragmentary basalt ground stone fragments were recovered, as well as shell beads.

Late Epipalaeolithic sites have been found at several locations throughout the Azraq Basin, although occupations have so far not been found in the southwestern part of the region. Azraq 18 is situated in the southern part of the Azraq Oasis marshlands and covers a deflated area of approximately 1400 m^2(Garrard et al. 1988; Garrard, Baird & Byrd 1994; Garrard 1991). The site is situated next to a small spring just over a kilometre south from the two principal springs in the southern Azraq marshes (Ayn Qasiyya and Ayn Soda). The site was contained within a carbonate-concreted mixture of aeolian silts of about 30 cm thickness. The chipped stone assemblage was clearly Natufian, with geometric microliths dominated by lunates. These displayed Helwan, as well as bipolar and abrupt retouch, and may hint at an early to middle Natufian age. Although no architectural remains were found the excavations revealed fragments of basalt ground stone tools, sandstone artefacts, perforated stones, shell beads and bone tools. The fragmentary and largely disarticulated remains of several individuals were found at the base of the occupation extending into what appears to have been a shallow pit excavated into the subsoil. Analysis of these remains by Bouquentin (Garrard pers. comment) has shown that the remains belong to three adults and five children. Four of the children are aged between one month and six years, while the fifth was aged between 11-14 at the time of death. The adult crania were decorated with ochre pigment, suggesting that defleshing occurred prior to burial. Although initially thought to be a series of secondary inhumations (Garrard 1991), it is now thought that the burials represent repeated instances of primary burial at Azraq 18 (Garrard pers. comment) Unfortunately, no suitable sample material for radiocarbon dating could be obtained to put a firm date on Azraq 18. A further Late Epipalaeolithic site in the southern Azraq marshes was found at Bawwab al-Ghazal. Here, small-scale excavations revealed a Natufian component characterised by the presence of lunates within a largely PPNB site (Rollefson et al. 1998, 1999). Late Epipalaeolithic elements have also been recognised within the assemblage from Area C at Ayn Qasiyya, which is characterised by a high degree of admixture of Early and Late Epipalaeolithic, as well as PPNB elements (see chapter 6). A further seemingly Late Epipalaeolithic (Natufian) site is located on a basalt spur ca. 5 km east of Azraq ed-Druze, which consists of a fairly extensive surface scatter with diagnostic abruptly and bipolar backed lunates. Further afield, from the Azraq Oasis Wasse and Rollefson (2005) have reported a Late Epipalaeolithic site at Jabal Tharwa ca. 50 km southeast of the Azraq Oasis. A surface survey of the site suggested the presence of several semi-circular structures accompanied by an extensive flint scatter. More detailed evidence is available from a series of Late Epipalaeolithic sites investigated by Alison Betts in the basalt deserts to the immediate north and east of the Azraq Basin (Betts 1988, 1991, 1998). Several of these sites are fairly ephemeral, often deflated, surface flint artefact scatters. The most substantial and only excavated site is Khallat Anaza, which preserves evidence for a single circular hut structure, as well as extant walls and bedrock mortars. A typical late Natufian chipped stone industry was recovered from the excavations.

The Epipalaeolithic sequence in the Azraq Basin offers a rich and fairly detailed picture of the final Pleistocene occupation of the region. Several sites contain multiple stratified occupations with distinct chipped stone. Indeed, the two extremely large sites of Jilat 6 and Kharaneh IV are unique instances of open-air sites of this time period, of a kind not found elsewhere in the southern Levant. Their appearance and the consistency of settlement that occurred there are remarkable, resembling small tells which have uniquely rich artefact inventories and archaeological features. A break in settlement continuity occurs only with the onset of the Holocene, since to date no PPNA sites have been identified in the region. During the following PPNB, an expansion of settlement in the west, as well as the potential rise of herding and pastoralism, and the establishment of cereal cultivation, led to more substantial sites, as evidenced by sites in the Wadi el-Jilat, southern Azraq marshes (Garrard et al 1988, 1996), and the basalt desert (Betts 1998). Some of these localities appear to have been temporary stations for hunting expeditions, while others appear to have been workshops for the manufacture of stone beads, which drew on the use of the so called Dabba marble greenstone (Wright & Garrard 2003).

PALAEOENVIRONMENT

The palaeoenvironmental situation in the Azraq Basin has to be considered from two different scales of analysis, based on the available regional data and more general palaeoclimatic predictions in the southern Levant. The time period discussed in this dissertation covers the marine isotopic stage 2 from around 25,000 to 15,000 cal. B.P., although the subsequent period until the beginning of the Holocene ca. 10,000 cal. B.P. is also of relevance. The Last Glacial Maximum (LGM), marking the maximum extent of the northern hemisphere ice sheets during the Würm glaciation (Bar-Matthews 2004; Bar-Matthews et al. 2003; Bar-Matthews 1999; Bar-Matthews et al. 1997; Baruch 1994; Baruch & Bottema 1991; Cappers et al. 1998; Cappers et al. 2002; Cordova 2007; Horowitz 1989; Issar & Zohar 2004; Moore 1992; Robinson 2006; Rohling 1999; Rosen 2007; van Zeist & Bottema 1982), corresponds to the end of the Upper Palaeolithic and the beginning of the Epipalaeolithic periods in the Levant, although the exact timing of this cultural transition is still poorly defined (Belfer-Cohen & Goring-Morris 2003). Sites such as Ohalo II (Nadel 2002; Nadel 2003) and those belonging to the so-called Masraqian (Goring Morris 1995) can be considered transitional, terminal Upper Palaeolithic/ initial early Epipalaeolithic sites. The array of C14 dates from Ohalo II clearly puts the site in the early to middle part of the LGM. Based on the, albeit limited, C14 dates available from the Azraq Basin, Uweynid 18 upper and Uweynid 14 lower and upper phase can also be considered to fall within this initial Early Epipalaeolithic time frame (Byrd 1998; Byrd and Garrard 1989; Garrard, Baird & Byrd 1994).

Ice core and marine sedimentary records recovered elsewhere in the northern hemisphere, predict somewhat humid conditions for the beginning of the LGM from ca. 24,000-20,000 cal. BP, followed by an extremely cool and dry period between 20,000-16,000 cal. B.P. In the Levant, the LGM is generally considered to be associated with cool and dry conditions that resulted in hyper-aridity and an expansion of deserts across the Arabian Peninsula and North Africa. Following 16,000 BP with the effects of the LGM having gradually worn off, melting glaciers led to generally moister conditions, which came only to a stop during the Younger Dryas, a short cool and dry period prior between 13-10,000 BP caused by short burst of rapid re-glaciation in the northern hemisphere, before the Holocene interglacial occurred at ca. 10,000 BP. This overall climatic model generally appears accurate, although data in certain areas suggest that this was not necessarily true for the entire Levant as "(...) proxy data for this period exhibit contradictory information" (Cordova 2007: 160). Climatic and palaeoenvironmental data is available from multiple sources within the Levant, although they remain at times poorly cross correlated and are generally not well dated. Levantine data derives from diverse sets of geoarchaeological records (lacustrine sediments and lake level data, palaeosol, fluvial sediments), palaeobotanical and faunal finds recovered from archaeological sites, terrestrial pollen cores, speleotherms, isotope studies of fluvial sedimentary sequences, molluscs, isotope studies of calcretes, deep sea cores from the eastern Mediterranean and the Red Sea, and coral records from the Red Sea. These diverse datasets trace different environmental proxies connected to climatic change, are affected by different sets of limitations and, in some cases cultural biases, reflecting a complicated, dynamic system and are therefore at times difficult to reconcile. Pollen sequences obtained from terrestrial cores are one such case in point. The Ghab Valley core (Niklewski 1970) suggested an increase in arboreal vegetation during the LGM, which was interpreted as evidence that the glaciation was not as dry in the north Levant as predicted by larger scale palaeoclimatic models. This core was, however, poorly dated. A more recently extracted and better dated core from the Ghab does not cover the LGM time frame, although the post 15,000 BP record preserved in this new core suggests a change from steppe vegetation to forests, which is more in line with predictions for a dry and cool climate prior to the 15th millennium (Yasuda et al. 2000). The pollen core from Lake Hula does also not extend to the LGM and, like the Ghab core, its chrono-stratigraphy has recently been criticised, leading Meadows (2004: 635) to argue that "none of the [Ghab and Huleh pollen] diagrams provides a well dated, high resolution pollen history of the Lateglacial period."

Other data also appears to contradict the general suggestion that the LGM was characterised by exclusively cool and dry conditions. The levels of Lake Lisan, which extended across the Jordan Valley from at least the 65,000 11,000 BP, reconstructed from sedimentary records, indicate a high standing lake during the LGM (Abed & Helmdach 1981; Abed 2008; Abed & Yaghan 2000; Bartov et al. 2002; Cordova 2007: 161; Niemi 1997; Stein 2001). This corresponds to the presence of other palaeo-lakes on the Transjordanian plateau extant during and shortly after the LGM, such as Lake Hasa which retains abundant evidence of lake shore final Pleistocene settlements (Macumber 2001: 22-23; Schuldenrein 1998; Schuldenrein & Clark 1994, 2001). Other data indicating extant lacustrine settings derive from the Azraq Basin (see below), the Qa al Jinz, Lake Burma, the al Wala silts on the Madaba Dhiban plateau, Wadi Siq Umm el Alda and Wadi Gharandel (Cordova 2007: 147). Overall, the presence of these lacustrine settings would suggest an overall wetter regime during the LGM at least in some parts of Jordan. However, Stein (2001) has linked the presence of these settings to lower evaporation rates due to cooler prevailing temperatures at the time. Although one potential explanation for higher lake levels and extant lacustrine environments, this scenario excludes other potential factors, such as hydrological and geological parameters (Cordova 2005:7 161).

Data from southern Jordan, namely the Jebel Qalkhan area, is also somewhat contradictory. Here, some early Epipalaeolithic sites sit on top of drift sand dunes which appear to have accumulated during the LGM (Henry 1998). Palaeobotanical data obtained from the same region, on the other hand, suggests an increase in arboreal pollen, thus indicating moister conditions (Emery-Barbier 1995). This has led Henry (Henry 1997) to suggest that the dry and cool LGM may have been interspersed with moister episodes. Carbon isotope data from the Negev collected from plant matter suggests a similar ratio today, which has also been interpreted as evidence against hyper aridity (Goodfriend 1999). Cordova (2005: 162) concludes that although mean annual rainfall may not have been abundant, frequent cloudiness and low temperatures could have kept evapotranspiration rates low, allowing more available moisture for plants. Under such conditions, deserts could have sustained steppe vegetation.

Following the LGM, melting glaciers and warmer conditions resulted in an amplification of moisture globally. Woodlands expanded at the expense of steppes and deserts, which appears to be confirmed both by the Huleh and Ghab pollen cores (Baruch & Bottema 1991; van Zeist & Bottema 1982). Although conditions ameliorated generally, two brief dry events interrupt this sequence at 13 12,000 BP and 10,800 10,000 BP, the latter of which is generally thought to correspond to the Younger Dryas (Cordova 2007; Robinson 2006). Various data sets, principally pollen records, palaeosol and lake level data, confirm the occurrence of these events, with Lake Lisan reaching a high stand between 15-14,000 BP and a drop in lake levels corresponding to the Younger Dryas. As far as the time period between 16,000 10,000 BP is concerned, palaeoenvironmental records are in general agreement of an oscillation of warm and wet with cooler and drier episodes, although the lack of overall dating evidence still proves to be an obstacle to directly link specific palaeoenvironmental and climatic shifts to specific cultural developments. At around 10,000 BP, the effects of the Younger Dryas begin to wear off and are replaced by the warmer and wetter conditions of the Holocene, which resulted in rising sea levels and expanded arboreal vegetation. This climatic transition is associated with the late/ final Natufian and the earliest PPNA communities in the Levant.

Zooming in on the Azraq Basin the evidence for the general climatic and environmental scheme outlined above can be partially confirmed, although certain aspects of the overall model are at odds with the available evidence. The Azraq Basin comprises an area of 12,000 km^2 along the eastern edge of the Transjordanian plateau, stretching from Syria in the northwest to the Saudi Arabian border in the southeast (Byrd & Garrard 1989; Garrard 1998; Garrard et al. 1988; Nelson 1973). Topographically the basin is dissected by a star-shaped system of wadis that drain toward the centrally-located Azraq Oasis.

Elevation above sea level drops from ca. 1800 m in the northwestern Jebel Druze, to around 500 m in the southeastern Wadi Sirhan area. This topographic situation is responsible for a unique drainage situation, in which water from the winter and early spring rainfalls is transported from as far afield as the Jebel Druze to the Azraq Oasis, both above and below ground. Although annual rainfall in most of the basin is below 50 mm, the southern, southeastern and eastern part of the basin, the high rainfall of the Jebel Druze area with 200mm mean average annual rainfall and above is nevertheless within the catchment zone. Above ground surface water is collected within mudflats across the basin, the largest of which is the Azraq *Qa'*, which can extend to an area of 50km^2 and can reach depths of 2m. Under present conditions this shallow lake dries quickly due to increasing evaporation caused by rising spring temperatures and usually disappears by mid to late spring or early summer. It also turns increasingly saline in the process.

The geology of the Azraq Basin is dominated by Cretaceous and Tertiary chalks and limestone in its southern half, which often contain beds or nodules of flint. The northern half of the basin is dominated by younger basalts and tuffs overlying the limestone. The basalts derive from volcanoes active in the Oligocene and Pliocene, although some erupted as recently as 4000 B.P. (Bender 1974). This geological situation also facilitates the underground drainage of abundant seasonal rainfall to the Azraq Oasis aquifers, which until very recently used to feed a series of springs in the northern and southern parts of the Oasis. These copious springs maintained a steady flow of water averaging 250,000 m^3/day in south Azraq, and 90,000 m^3/day in north Azraq (Nelson 1973). Associated with these springs were two extensive marsh and wetland areas. The North Azraq marshes were the smaller of the two covering about 1.8 km^2. The southern marsh, fed by the springs at Ayn Soda and Ayn Qasiyya, covered a total area of ca. 5.6 km^2. These wetlands were, until their recent destruction due to intensive water extraction from the underground aquifers, home to diverse plant and animal communities. Critically, the aquifers were characterized by a low discharge to recharge ratio, meaning that only 2% of the mean annual rainfall in the Azraq Basin was sufficient to fully re-supply the aquifers and guarantee year-round outflow (Karabsheh 2000). Indeed, water extracted from the ground today has been dated to between 20,000-4,000 years old, which indicates the very gradual recharge mechanism and its longevity (Froehlich et al. 1987; Karabsheh 2000). This balance was only recently disturbed. The age of the water provides an indication of the time required for the water to accumulate and suggests the increasing imbalance of the water supply chain. With Azraq being the only permanent source of water in an area half the size of Wales it has been a focal point for human settlement, as well as a resting point for travellers from the Arabian interior to and from the Transjordanian plateau throughout history.

Palaeoenvironmental data in the Azraq Basin is thus far limited to two principal sources: sediments and faunal material from archaeological sites. Although sediment cores have been extracted from the mudflats in the Azraq Oasis, they have yielded only limited results and remain undated (Davies 2005). Palaeobotanical sampling at archaeological sites in the basin has also yielded only limited data. Only *Chenopods* have been recovered from Jilat 6 upper phase (see above, Colledge 2001). Sediment profiles excavated within or underlying archaeological sites have provided important clues for reconstructing the local environmental conditions. Uweynid 18 (upper phase), Uweynid 14, Jilat 6, Jilat 22 and Kharaneh IV are all associated with deposits that suggest periods of pedogenesis at intervals between c. 24,000 and 15,500 BP. This is an area where no pedogenesis is occurring at the present time, and it suggests periodic vegetational cover and damper conditions than at present (Byrd and Garrard 1989: 92). At Uweynid 18, pedogenesis has been observed in deposits associated with the upper occupational phase, dating to ca. 23-22,000 BP. Gleying occurred within clayey-silts at Uweynid 14, associated with a similar age. This suggests extant surface water and the existence of wetland conditions at or next to the site. The lowest phase of Jilat 6, associated with a chipped stone industry similar to that of Uweynid 18 upper phase, is underlain by aeolian silts that exhibit a columnar structure deriving from pedogenesis. The lower occupational phase of Jilat 22 is associated with indurated calcareous silts that contained Phragmite stems and rhizomes in growth position, strongly suggesting a former marsh deposit. At Kharaneh IV, Muheisen described the presence of clayey-silts and clay at the base of the lowest occupational phase (Phase A). Their presence has recently been confirmed by renewed excavations and form a clay deposit of at least 50cm thickness (personal observation 2008).

As part of Garrard's fieldwork in the basin, two sedimentary sequences obtained from geological sections were also studied (Garrard et al. 1988)These indicated that the Azraq *Qa*, as well as the wet and marshlands, are of considerable antiquity, since lacustrine deposits and former marsh deposits were documented, although they have as yet not been accurately dated. However, there are some unconformities in this sequence, which are at present difficult to interpret. New data uncovered from several localities in North Azraq, where a Canadian U.S. team has excavated a series of geological trenches, is now also becoming available (personal observation 2008, personal comment Cordova and Noel 2008). Previous suggestions for an extensive Azraq palaeo lake could not be substantiated on the basis of this and other work. Although it appears that the Azraq marshes are clearly of a considerable age, the size of temporarily flooded areas or more permanent standing water settings in the oasis cannot at present be fully determined. The pedogenesis and presence of clays in various deposits and stratigraphic sequences associated with early Epipalaeolithic sites throughout the Azraq Basin suggest, however, that extant surface water was present at various locations throughout the area, probably forming locally-restricted wetlands.

Faunal remains constitute the second major source of available palaeoenvironmental data for the Azraq Basin and the time period in question. However, data from this source must be treated with caution, since faunal remains are not very fine-tuned to general climatic and environmental shifts. Furthermore, they are subject to a cultural filter since Epipalaeolithic communities likely hunted their prey selectively and the present taxa may therefore not be a clear representation of the species present in the environment. Generally speaking, sites away from the oasis have taxa representative of a steppic, semi-arid or arid setting. As one could perhaps expect, the presence of *Bos primigenius* indicates springs and marshlands in the immediate vicinity of the Oasis (Garrard 1991; Garrard 1998; Garrard, Baird & Byrd 1994; Martin 1994). This is especially the case at the late Epipalaeolithic site of Azraq 18.

Overall, the picture that emerges from this data is one that suggests a dry and cool climate during the Early Epipalaeolithic which was either characterised by interspersed periodic wet events or generally more extant surface water due to lower rates of evaporation related to lower temperatures. Relying on a model of low evaporation rates, one would have to explain the source of the additional extant water responsible for wetland sustenance in the region. Together with faunal data and evidence from other parts of the Levant, it seems plausible that the LGM was probably characterised by more humid conditions here than previously understood, which effectively resulted in a landscape of steppic vegetation interspersed with smaller, perhaps seasonal, marshlands. Although Copeland and Hours (1988) pointed out that the Azraq Basin is situated within a transitional zone in which small changes in climate can have significant impact, this does not apply to the Oasis itself. The Azraq Oasis appears to have been the one stable ecological system in the region, with spring flows largely unaffected by short-term climatic fluctuations and long-term adverse climatic changes, due to the low discharge to recharge ratio of the Azraq springs aquifers. Macumber (2001: 11) has suggested that the groundwater emerging as springs around the perimeter of the basalt is largely buffered against adverse climate change and provides a hydrologically-stable setting in a region of otherwise environmental instability. The oasis would have thus represented ideal conditions for human occupation and a focal point for settlement during multiple seasons of the year.

SUMMARY

Intensive research in the Azraq Basin since the late 1970s and early 1980s has resulted in a comprehensive picture of the Epipalaeolithic occupation of this region during the final Pleistocene and thereafter. A series of multi-phase sites have been excavated and provide significant insights into final Pleistocene Azraq landscapes. However, a number of limitations to this perspective have to be mentioned. Surveys were not designed to provide full coverage of the Azraq region (Garrard et al. 1977) and our understanding of site distribution patterns is therefore necessarily partial. Future work in the region might well change our understanding of site distribution and the density of sites in the landscape. Excavations have also so far been limited to very small surface exposures where the Epipalaeolithic is concerned (Neolithic sites have been excavated using larger open area exposures). Their principal aims were to establish the stratigraphy of sites and obtained suitable samples of material culture, fauna and radiometrically datable material. They did not expose large contiguous areas on which basis inter-site spatial patterning could be discussed. Despite these limiting factors the information and evidence gathered to- date and summarised in this chapter highlights the Azraq Basin as one of the principal Levantine regions for Epipalaeolithic research, showing that it contains a number of unique sites and sequences.

Chapter 6:
Ayn Qasiyya :
Excavations and Survey

INTRODUCTION

The basis for the further discussion of landscape, marginality and social evolution outlined earlier, is the fieldwork carried out at the two Epipalaeolithic sites Ayn Qasiyya and AWS 48. Fieldwork at these two sites was conducted between October 2005 and September 2007 as part of three seasons of excavations and surveys, which will be described in detail here and in chapter 7. Here I provide an account of the stratigraphy at the sites, the information gained from surface survey at AWS 48, discuss some of the palaeoenvironmental information and dating of the sites, as well as to provide a discussion of site-formation processes. Both Ayn Qasiyya and AWS 48 were first discovered during the Azraq Wetlands Survey conducted by Gary Rollefson, Leslie Quintero and Philip Wilke in 2000 (Rollefson et al. 2001). The survey proceeded by walking the entire extent of the current Azraq Wetlands Reserve in transects, recording all sites from individual find spots to more substantial sites. The survey succeeded in locating a total of 133 sites. Eighty eight sites were classified as general Epipalaeolithic, early Epipalaeolithic or Natufian in date. This detailed survey therefore revealed an apparently intensively occupied and utilized oasis, with significantly more sites recorded than the Azraq survey conducted by Garrard et al. (1977). This appears to relate to three potential factors: the changing nature of the Azraq landscape largely due to modern development, differences in definition of what constitutes a site, and the use of different survey methodologies. Between the late 1970s and the late 1990s, the Azraq landscape has changed dramatically (compare Figures 6.1 & 6.2). Water pumping from the oasis began in the 1960s and increased dramatically by the early 1990s following the first Gulf War. Following the war, Jordan's population increased dramatically from the intake of Palestinian refugees expelled from Kuwait. The population increases put further pressure on the country's already scarce water resources, and lead to an increase in the amount of water extracted from the oasis. Coupled with a steady increase of water pumping often illegal due to the establishment of fairly extensive agricultural farms in the Azraq area, which generally grow cash crops for the markets in Amman, a decrease in the Azraq Oasis water table occurred. The delicate balance of input and output in the oasis's aquifers, once maintained by annual rainfalls and a relatively low rate of outflow from the springs, was severely affected. In essence, more water was pumped than could be renewed on an annual basis and a steady (and steep) decrease in the water table occurred. This led to the extinction of first the springs in North Azraq already during the early 1980s, followed by the seizure of spring flow in South Azraq by the early 1990s. The result was a rapid decline in marshlands with severe effects on local wildlife and plants. Migratory bird species, which had long used the Azraq Oasis as a critical resting and breeding location on their migrations from Europe to Africa, became rare. To preserve the uniqueness of this ecosystem and provide a lifeline for migratory birds, the Azraq Wetlands Reserve was created, which encompasses practically the entire area of the former South Azraq wetlands. The creation of the reserve, which has since re-generated some of the former wetlands by artificially pumping water into newly created pools, has protected this area from modern development over the last two decades. Significantly more buildings and farms have been built in South Azraq, which have damaged or destroyed a number of archaeological sites, including Azraq 18 (Garrard 1991). The changed Azraq landscape has partially facilitated the discovery of archaeological sites since the earlier surveys, but has also focused archaeologists' attention on those areas protected from modern development. The disappearance of water from the two principal pools in the southern Azraq marshlands, Ayn Soda and Ayn Qasiyya, has, for example, facilitated the discovery of a number of sites formerly immersed in water. Surveys have also been able to concentrate on the wetlands reserve, rather than deal with the wider Azraq Oasis, enabling the more focused and detailed methodology of transect fieldwalking. Lastly, this methodology has also resulted in the identification of sites that comprise only few archaeological artefacts and may perhaps be better understood as isolated findspots. While a number of sites discovered as part of the Azraq Wetlands Survey in 2000 are substantial, many others consist of only a few pieces of chipped stone found on the surface. The picture may therefore be somewhat skewed regarding the actual intensity of occupation. Nevertheless, the two sites discussed here and in chapter 7 are among the most substantial in the Azraq Wetlands Reserve and were therefore selected for further study.

Ayn Qasiyya (Figure 5.5, 6.3, 6.4, 6.5, 6.6) is the name of the second largest spring in the southern Azraq marshlands. It is situated ca. 150 m north of the largest south Azraq spring, Ayn Soda. Here, a number of prehistoric sites were found by Rollefson et al. (1997), which date to the Lower and Middle Palaeolithic and Epipalaeolithic. The archaeological sediments at Ayn Qasiyya (AWS 122) were spotted in the north wall of a pool that was excavated around the spring head, probably in the modern era, to extract water. Rollefson et al. (2001) described two separate localities, the first located in the eastern part (Locality I; Figure 6.7) of the northern wall, the second located in the western part (Locality II; Figure 6.8). From Locality II Rollefson et al. (1997) reported the re-

Figure 6.1: View of Ayn Soda today (courtesy of Lisa Maher).

Figure 6.2: View of Ain Soda in the 1960s (from Mountfort, G. 1966. *Portrait of a Desert*. London: Collins, plate 4)

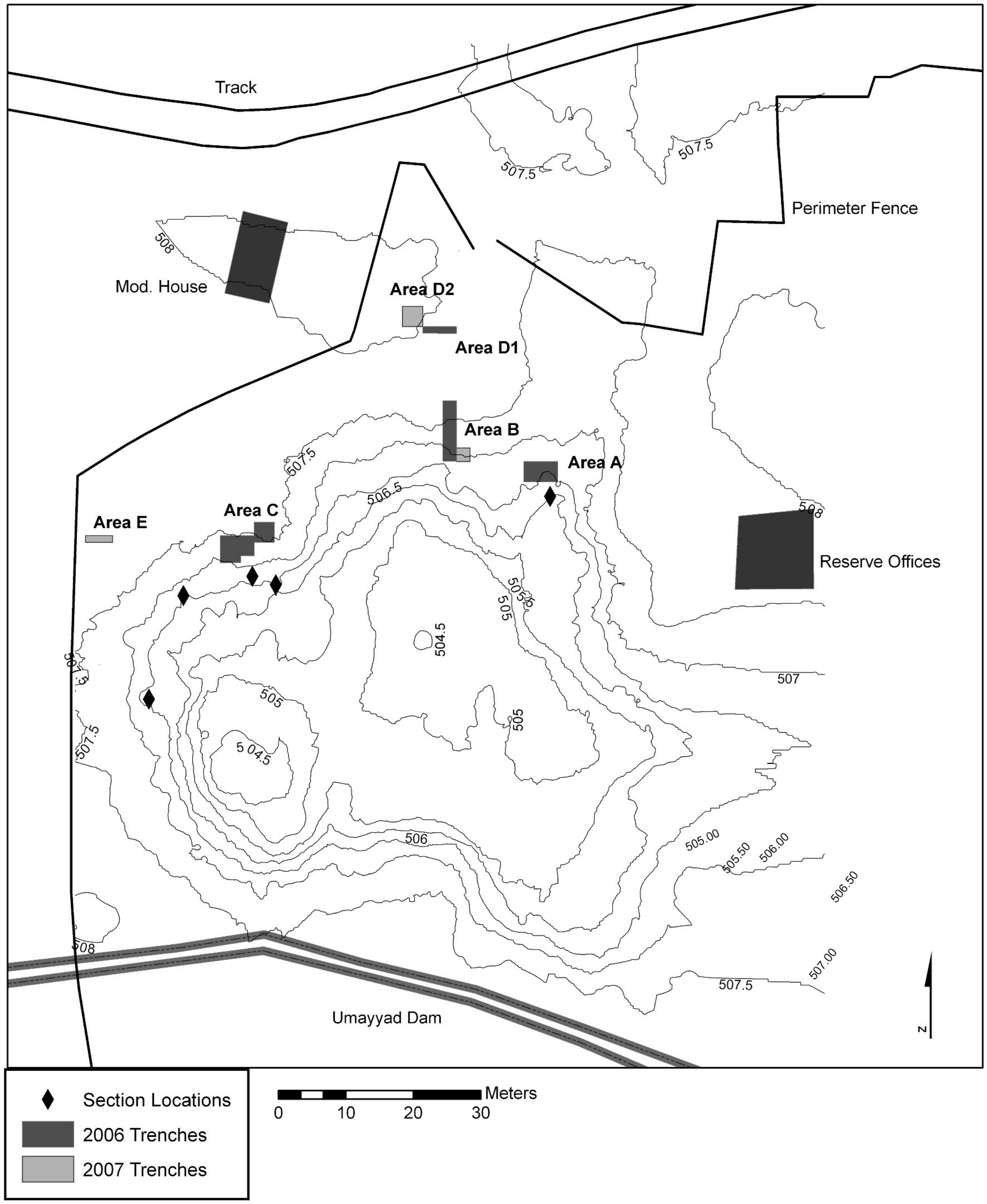


Figure 6.3: Overview plan of Ayn Qasiyya, showing location of excavation trenches & sections

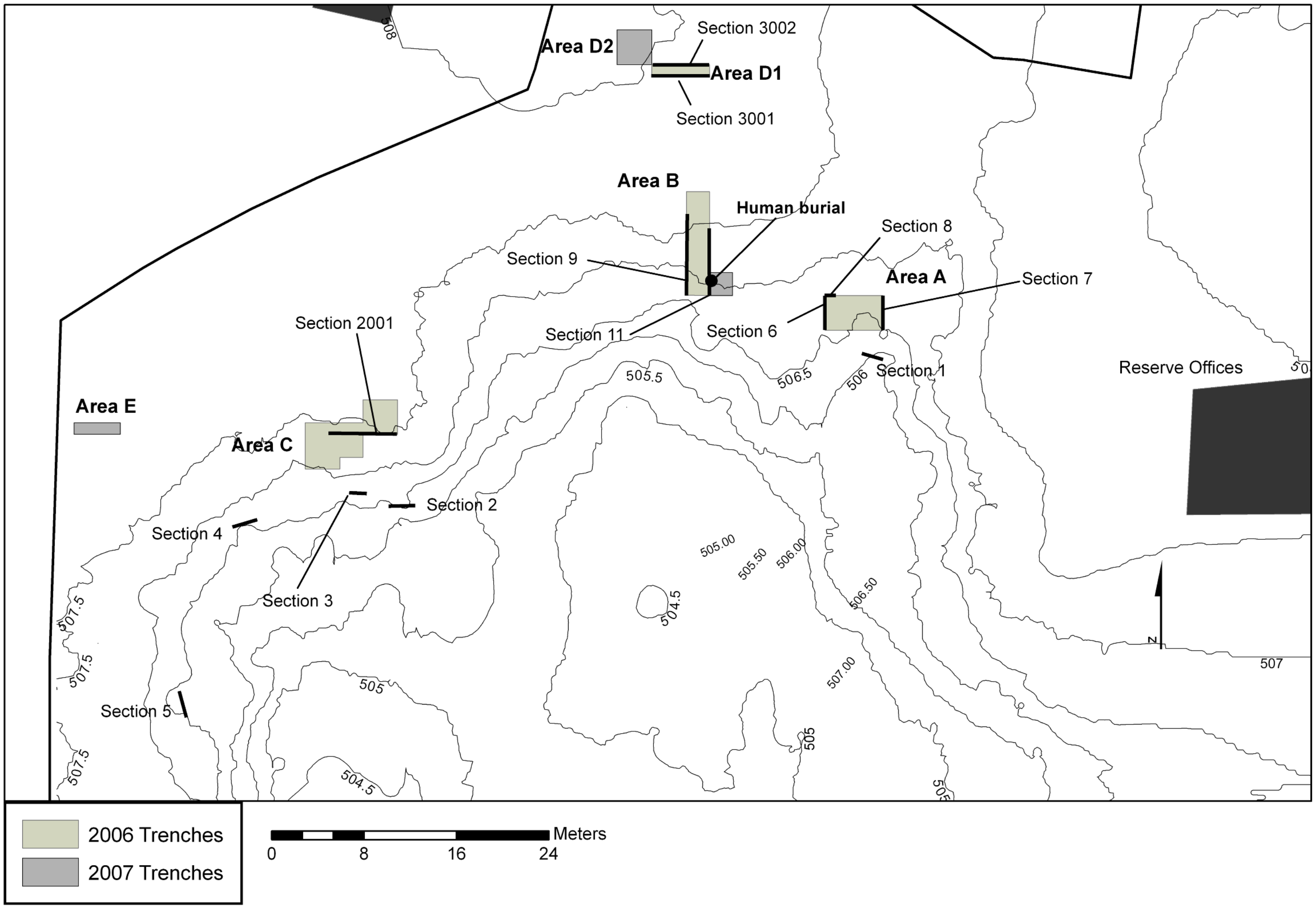


Figure 6.4: Detailed plan of Ayn Qasiyya showing location of excavation trenches and sections

Figure 6.5: View across the excavation area , looking Northwest. The Ayn Qasiyya pool is to the right.

Figure 6.6: The western part of the northern wall in the Ayn Qasiyya pool, showing location of Locality II.

Figure 6.7: Locality I (later section 1) prior to cleaning in 2005. Clearly visible is the dark-brown marsh deposit below the carbonate concreted horizon.

Figure 6.8: Locality II (later section 4) prior to cleaning in 2005.

covery of Levallois Mousterian artefacts from the base of the standing section, as well as a microlithic assemblage from a deposit c. 50 cm above the Levallois Mousterian layer. At Locality I, further microlithic artefacts, some of which were geometric, were collected. The authors concluded that Ayn Qasiyya promised to provide "a lucid understanding of the Epipalaeolithic exploitation of the marshlands" (Rollefson et al. 2001: 79). The site is therefore located in the immediate vicinity of one of the two copious springs in the southern Azraq marshes and appears to be directly related to the availability of this critical resource here.

AYN QASIYYA EXCAVATION AREAS AND STRATIGRAPHY

Five excavation trenches were dug at Ayn Qasiyya in three seasons in October 2005, July and August 2006, and August 2007 (Richter 2007b; Richter 2006). In addition, smaller scale excavations were carried out along the northern wall of the Ayn Qasiyya pool, where five sections were cleaned and partially excavated to establish full stratigraphic profiles. Section 1 (Figure 6.9) corresponds to Rollefson et al.'s (2001) Locality I, while section 4 corresponds to Locality II (Figure 6.12). Two more sections were cleaned and recorded in the northern wall, labelled sections 2 and 3 (Figures 6.10 & 6.11). An additional section (#5) was cleaned and recorded in the western wall of the pool (Figure 6.13; for correlation see Figure 6.32). These provided stratigraphical and geoarchaeological insights into site formation and palaeoenvironmental conditions. Area A is the easternmost trench, situated atop section 1 (Locality I). It targeted the rich artefact concentrations noted in section. The trench was first opened in 2005, extending 4 m east-west and 3 m north-south. A 1 m-wide and 3 m-long addition extending the western edge was excavated in 2006. Following the stripping of the topsoil and the exposure of the site across the trench, a 3 m-long and 1 m-wide sounding was excavated down to natural along the eastern edge of the trench, establishing two north-south orientated sections. Although the archaeological site was exposed across the trench, the deposits were only cut in two soundings at the eastern and western edge of the trench. The 1x3 m-sized sounding in the east was excavated down to natural and documented the same archaeological sequence as in section 1 (Figure 6.14, 6.15, 6.16 & 6.18). The sounding in the west measured 1x2 m. Here, the archaeological horizon was much thinner, measuring ca. 20 cm in thickness, when compared to section 1 and section 7 (Figure 6.17, 6.19). Area B began as a 1x1 m test trench excavated in 2005, which exposed archaeological deposits ca. 50 cm below modern surface. It is situated 13 m west of Area A. To expose more of these archaeological deposits, a 2 m wide (east-west) and 11 m long (north-south) trench was excavated in 2006 revealing the site across the entire trench. Following the exposure

Figure 6.9: Section 1 (formerly Locality I) after cutting back and cleaning, August 2006.

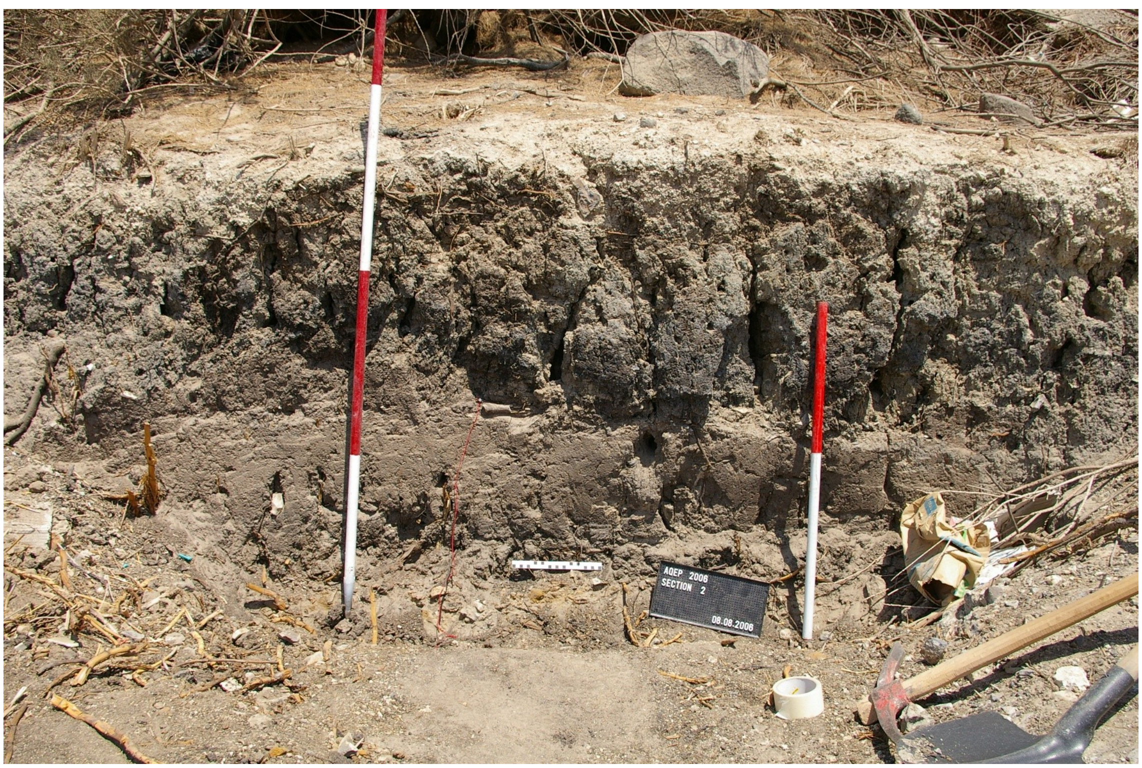


Figure 6.10: Section 2 after cleaning, August 2006.

Figure 6.11: Section 3 after cleaning and partial excavation in August 2006.

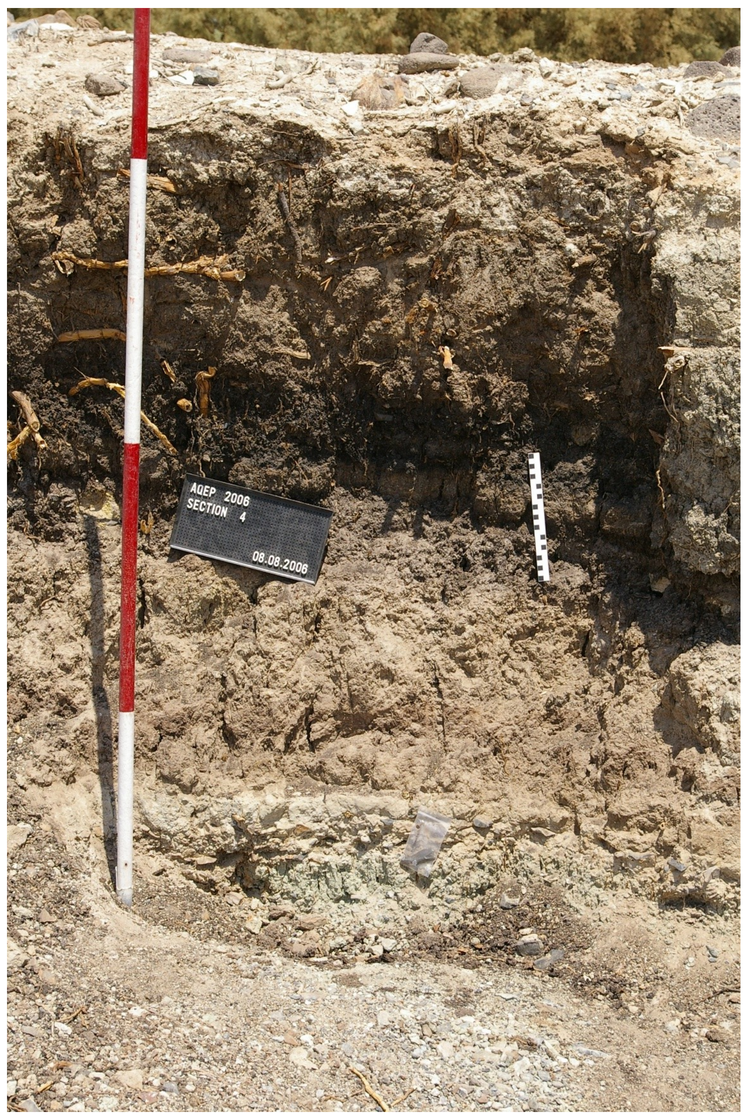


Figure 6.12:
Section 4 after partial cutting back and cleaning, August 2006

Figure 6.12: Section 5 after cutting back and cleaning in August 2006.

of semi- articulated human remains in the eastern part of the trench in 2006, a 2x2 m extension was excavated in 2007 to fully reveal the human remains in this area (Figure 6.20, 6.21, 6.22, 6.23, 6.24).

Excavations in Area B did not proceed to sterile deposits in all parts of the trench. In the northern part of this area, the archaeological horizon was difficult to distinguish and appeared to thin out considerably compared to the southern part of the trench. Area C was excavated in 2006, following the discovery of dense concentrations of lithic artefacts and animal bone in section 3 in 2005. It is situated 34 m west of Area B. The aim of this trench was to reveal and document the prehistoric occupation in this area, associated with Locality II (Figure 6.25). The area consisted of two connected trenches, one measuring 4x5 m, the other 3x3 m. The odd overall shape of the trench catered for the preservation of a modern revetment wall to the south of the trench. This is probably associated with the modern water extraction from the Ayn Qasiyya pool. The entire area was excavated down to the top of the main archaeological deposit, and a 6 m long, east-west orientated sounding was excavated down to natural in the centre of the trench detailing the overall stratigraphy (Figure 6.26, 6.27). Area D was first established in 2006, when a 5 m-long (east-west) and 1 m-wide (north-south) trench was excavated to the north of Area B to test whether archaeologically significant deposits could be found in this area (Figure 6.28). In 2007 a further 3x3 m trench, adjacent to the 2006 trench was opened, and labelled D2 (the original trench D was re labelled D1). D1 was excavated in 2006 and 2007 to natural (Figure 6.29, 6.30 & 6.31), while D2 exposed the top of archaeologically significant deposits in 2007, but was not excavated further due to time constraints.

Overall, the stratigraphic sequences of Areas A, B and D is very comparable (Table 6.1a, b, c). The generalized sequence consists of a very compact carbonate-concreted topsoil of varying thickness, followed by a series of clayey-silts of highly organic content, which have undergone pedogenesis in the past. They contain abundant lithic artefacts and animal bone, none of which appeared sorted, ordered, orientated or laid down at a horizontal incline in any way. These clayey-silts overlie a substantial laminated silty-clay deposit, which is undoubtedly of lacustrine origin and appears to be associated with a substantial lake present in the area prior to human occupation (see below). In Area A and Area B the nature of the archaeologically-rich marsh deposit is not continuous. While the deposit reaches a thickness of up to 50 cm in the southern part of Area B and the eastern part of Area A, it is much thinner in the northern part of Area B and the western part of Area A. In these areas it also does not directly overlie the sterile silty clay lacustrine sediments, but is preceded by a carbonate-concreted horizon, which itself overlies the lacustrine silty clays. This suggests that there was a stable land surface in some places, perhaps in the form of small islands or raised areas, which may have provided suitable occupation zones. Those areas in which marsh deposits can be found today appear to correspond to inlets or channels, cut during or prior to occupation of the site and then filled with occupational debris while a marsh pedogenesis occurred. The artefact-bearing deposits in Areas A, B and D are associated with an exclusive Early Epipalaeolithic chipped stone industry, which forms the basis of the discussion throughout this dissertation.

The stratigraphic sequence in Area C is different. The firm topsoil is underlain by a sandy-silt deposit with a high organic content, but different to the highly organic deposits in Areas A, B and D. Apart from its composition, the main difference is that it is archaeologically sterile. Artefact-bearing deposits occur below this layer in a series of light, yellowish-brown, sandy-silts. Lithic artefacts from these deposits contain, however, a highly mixed lithic assemblage. The material contains diagnostic Early Epipalaeolithic artefacts (La Mouillah points and fine, thinly-made arched backed bladelets), Late Epipalaeolithic Helwan, abruptly or bipolar backed lunates indicating a Natufian phase, as well as Helwan, el-Khiam, Byblos and Jericho points that are clearly related to a (early?) Pre-Pottery Neolithic B occupation. Their occurrence all within one deposit clearly suggests admixture caused by erosion, which is confirmed by the overall appearance of the de-

Figure 6.14: Area A after clearing of topsoil in October 2005 (looking east)

Figure 6.15:
Area A, eastern sounding, looking North

Figure 6.16: Area A, east sounding, section #7

Figure 6.17: Area A, West section, showing carbonate concreted horizon above and below marsh deposit.

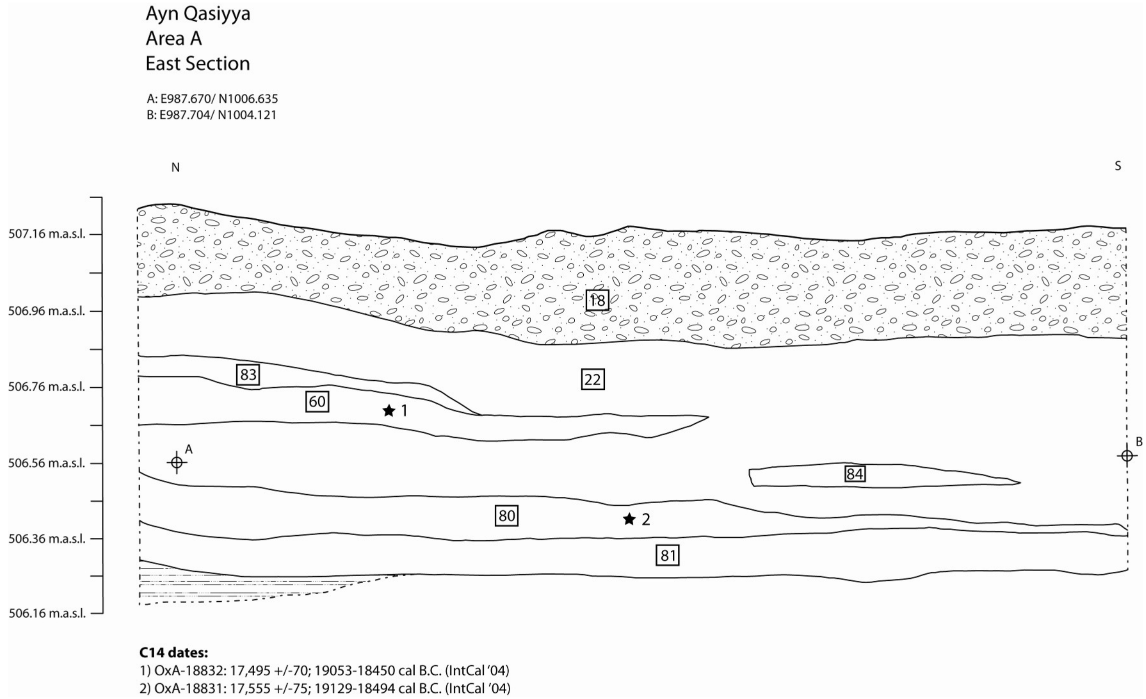


Figure 6.18: Area A, drawing of section #7

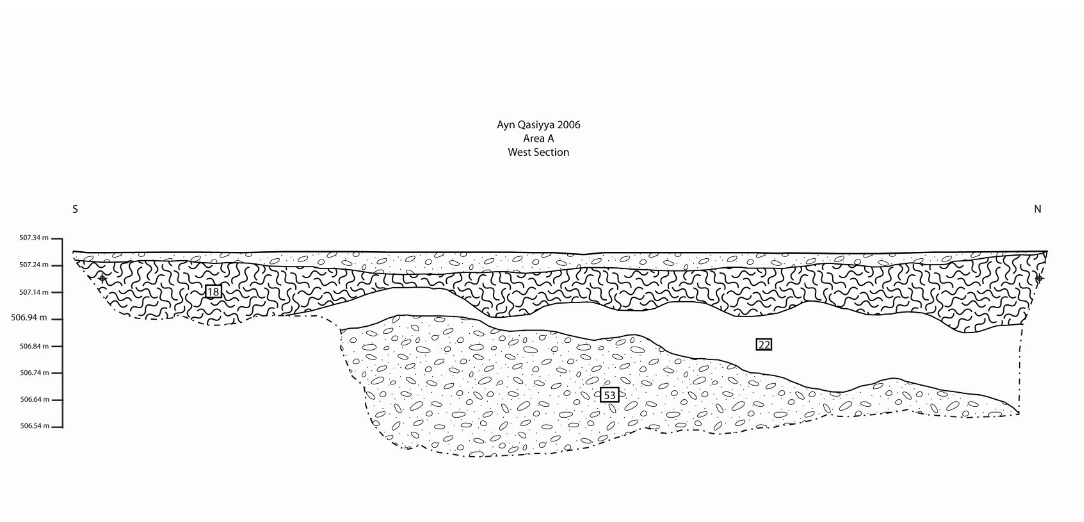


Figure 6.19: Area A, drawing of section #8

Figure 6.20:
Area B under excavation in August 2006. Looking south with Ayn Qasiyya pool in the background.

Figure 6.21: Southern part of Area B in August 2007, showing eastern extension of trench in the background and human remains excavated in block shape in preparation for lifting

Figure 6.22: West section #9 in Area B (digitally stitched together in Photoshop from two separate photographs)

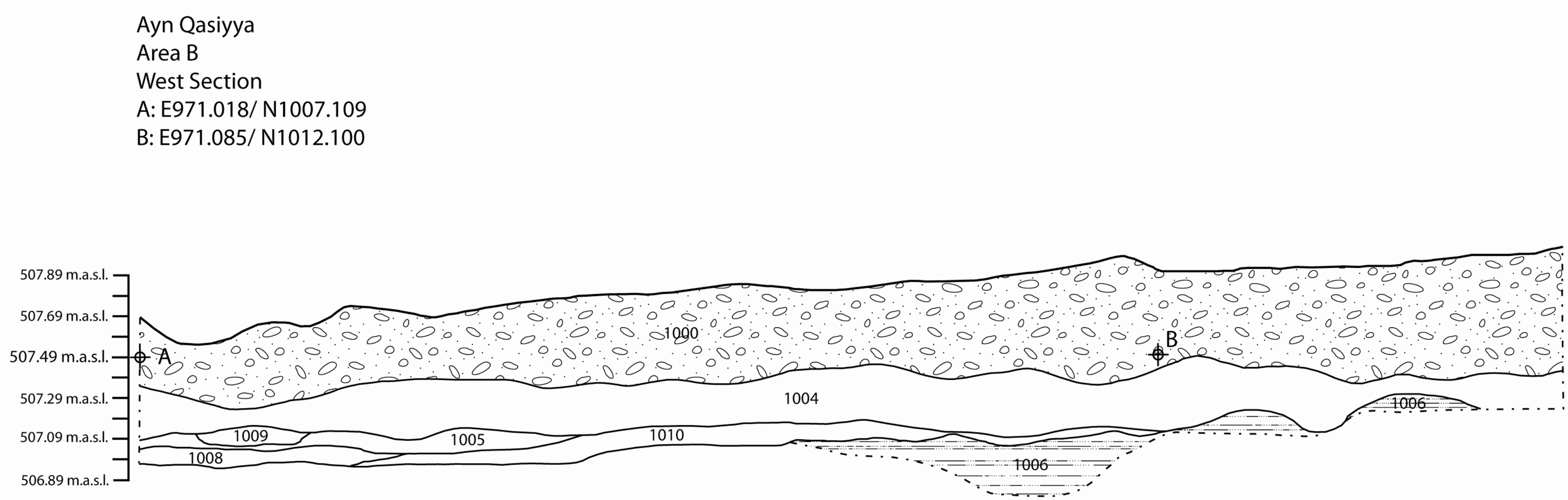


Figure 6.23: Area B: drawing of west section #9

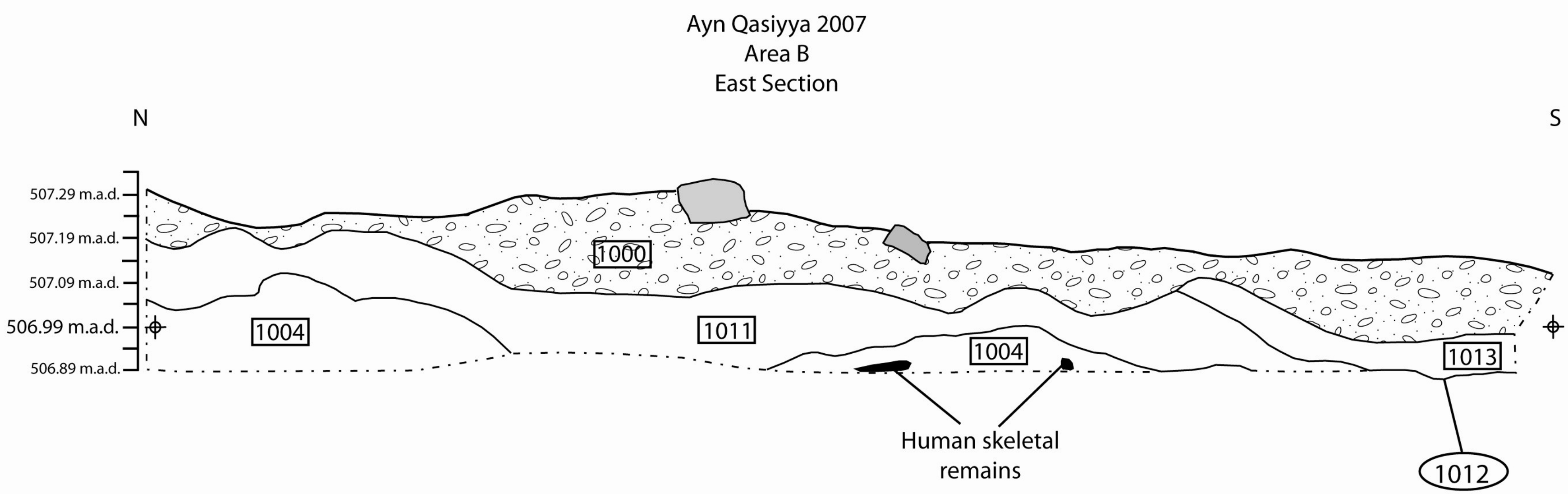


Figure 6.22: Area B: drawing of East section #11, showing position of human remains.

Figure 6.23: Excavations in Area C in August 2006, looking northeast.

Figure 6.24: Area C, South section #2001, showing erosional features. Base of trench is on top of palaeo-channel fill.

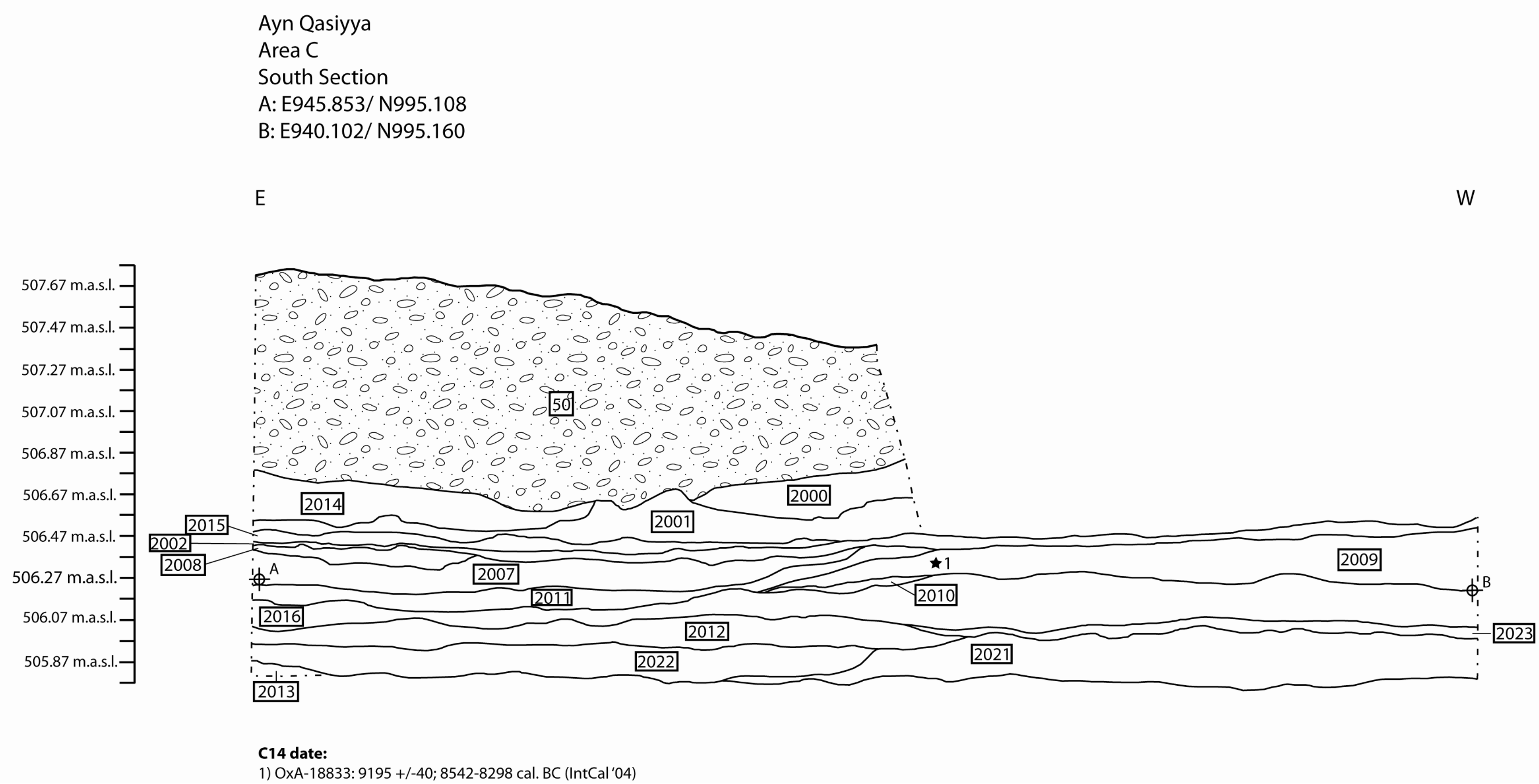


Figure 6.27: Area C, drawing of south section #2001

Figure 6.28: Overview of Area D, looking east (area D1 in the foreground, D2 in the background)

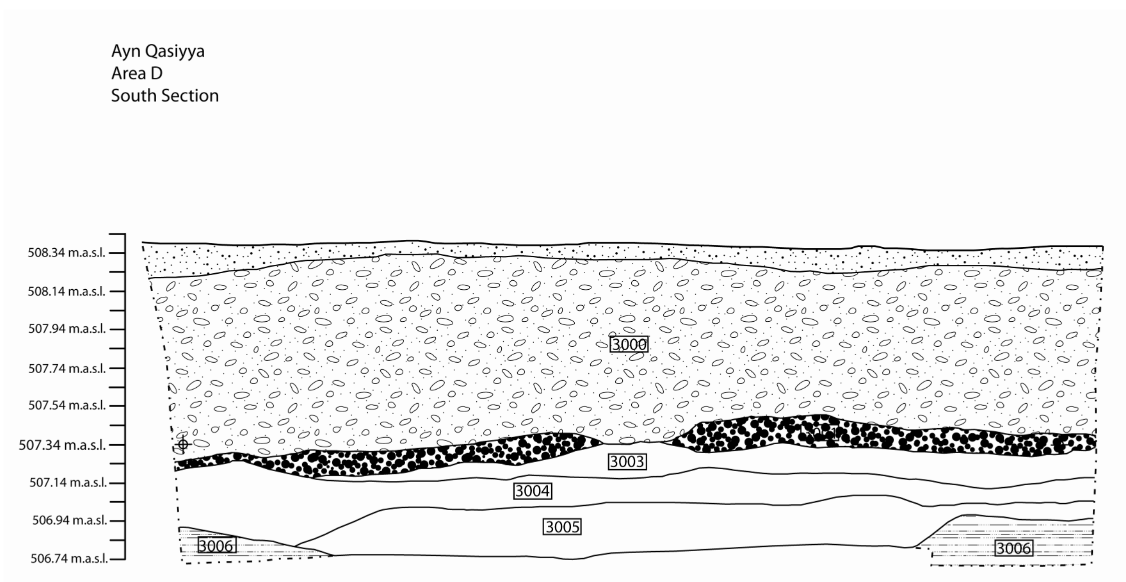


Figure 6.29: Area D1, south section #3001

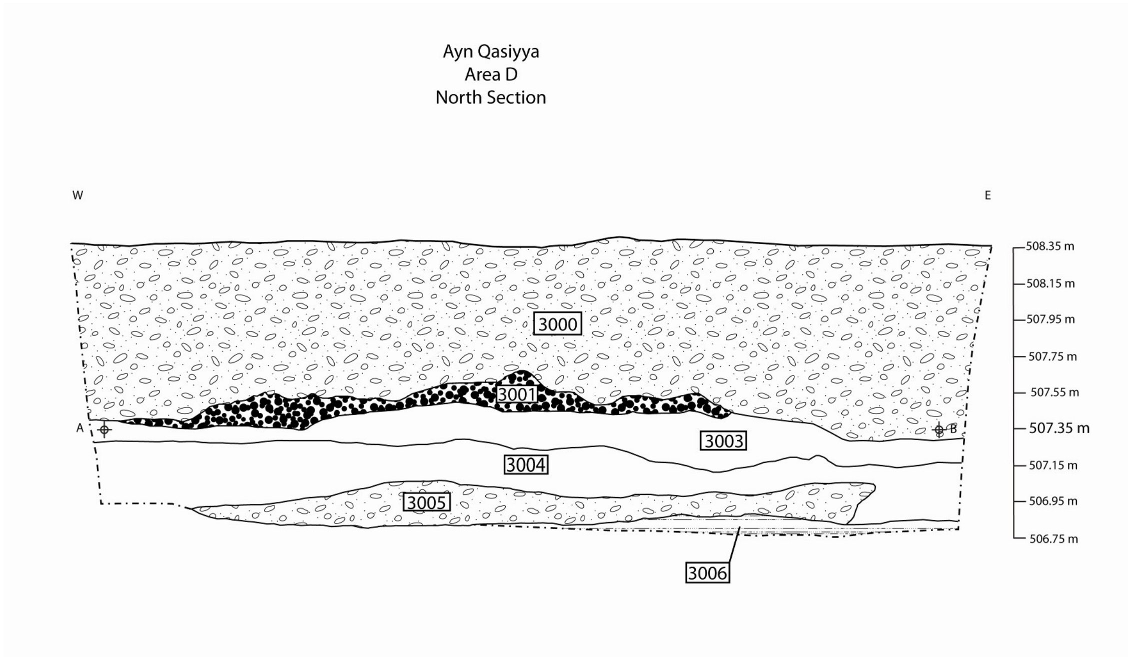


Figure 6.30: Area D, north section #3002

Figure 6.31: Area D, south section. Detail of buried marsh deposit (Unit III).

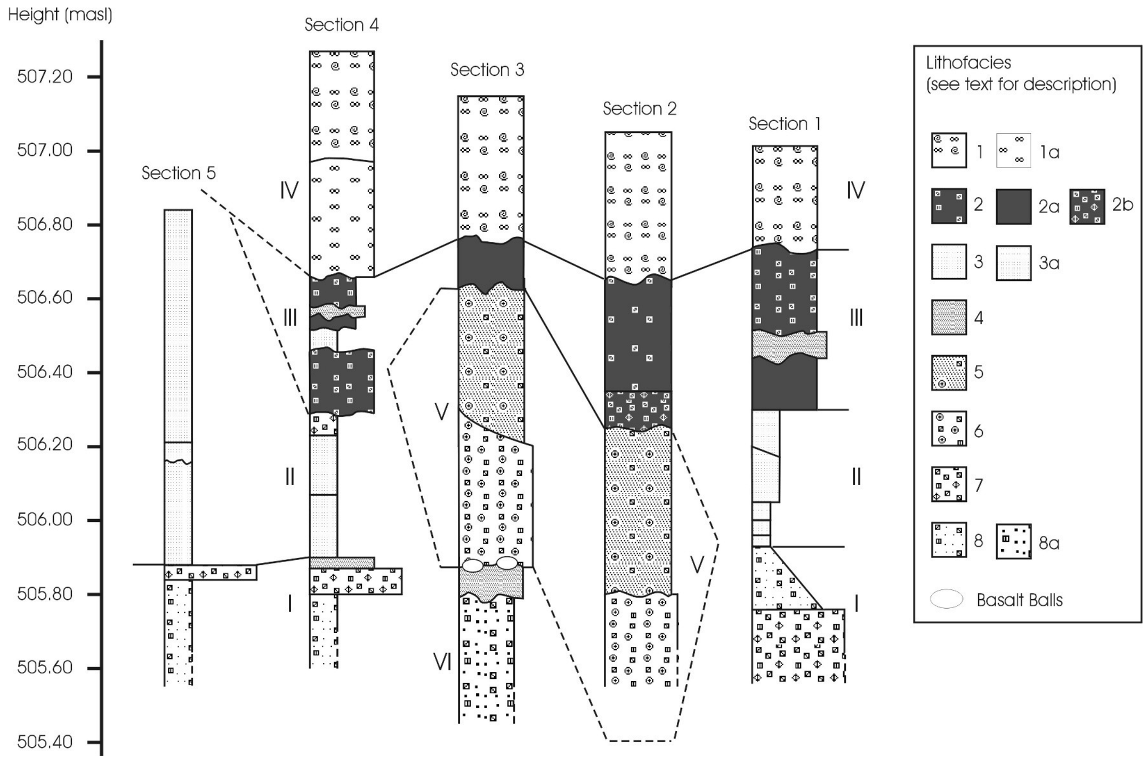


Figure 6.32: Correlated profiles of the Ayn Qasiyya pool sections

posit infilling what appears to be a channel (see below). In addition to the observations gained from the excavations, stratigraphic observations were also obtained from sections in the Ayn Qasiyya pool. The sequences observed in each section are listed in table 6.2 (see also Figure 6.32).

RADIOCARBON DATES

Five Accelerator Mass Spectrometry dates were obtained from charcoal, which were analysed at the Research Laboratory for Archaeology and the History of Art at the University of Oxford. The charcoal plant species were identified by Eleni Asouti (University of Liverpool) prior to dating to exclude the use of long-lived species, which could have provided a sampling bias. The samples were derived from section 1, Area A and Area C (Table 6.3,; see also Figure 5.6). The four dates obtained from Area A and section 1 are tightly clustered and show very low standard deviations, especially compared to other dates from Epipalaeolithic contexts. Sample #8 was dated twice and both results have a very comparable C14 age. The tight clustering of the Ayn Qasiyya dates, their low standard deviation, the secured identification of the wood charcoal as short-lived species, as well as the stratigraphic integrity of the dates (sample #24, which is younger than #33

	Depth	Geoarchaeological Units	Context #'s	Description
Area A	507.18-506.85 m.b.d.	IV	18	creamy white, very compact, carbonate concretion horizon, chipped stone and animal bone found occasionally, but interspersed with Byzantine, Islamic and post-medieval pottery, and modern material culture, boundary to underlying deposit is sharp
	506.85-506.36 m.b.d.	IIIb	22, 83, 60, 84	very dark brown, compact, highly organic clayey silt, with frequent chipped stone and animal bone, and moderate amounts of fine charcoal (smaller than 5mm in diameter), frequent root disturbance and animal burrows, boundary to underlying deposit is moderately clear.
	506.53-506.35 m.b.d.		80	mid brownish yellow compact sandy silt, frequent chipped stone and animal bone, moderate occurrence of charcoal (up to 10mm in diameter), moderately clear boundary to underlying deposit
	506.34-506.23 m.b.d.		80, 81	dark brown highly organic clayey silt, loose and crumbly, contains moderate amounts of fine charcoal (less than 10mm in diameter), frequent chipped stone and animal bone, boundary to underlying deposit is clear
	506.23 - ?? m.b.d.	II		mid greenish grey clayey silt, compact and sterile, lacustrine/ lake sediment
Area B	507.59-506.94 m.b.d.	IV	1000, 1001, 1011	topsoil, creamy white, very compact, carbonate concretion horizon, chipped stone and animal bone found occasionally, but interspersed with Byzantine, Islamic and post-medieval pottery, and modern material culture, boundary to underlying deposit moderately clear
	506.93-506.79 m.b.d.	IIIb	1004	Compact dark brown clayey silt, frequent occurrence of chipped stone and animal bone, highly organic, partially disturbed by rooting, boundary to underlying deposits is clear to moderately clear, rare inclusions of small charcoal (less than 10mm in diameter), this deposit contained semi-articulated, primary burial of an individual
	506.94-506.67 m.b.d.		1005, 1008, 1010	Dark brown, highly organic, sandy silt, with occasional charcoal inclusions and frequent highly degraded pieces of basalt; lower down turns into a thin mid grey layer with less frequent finds, situated just above sterile lake sediments with which it shares a clear boundary
	506.78-?? m.b.d.	II	1006	Mid greyish green, compact silty clay, lacustrine/ lake sediment

Table 6.1a: Summary of stratigraphic sequence in excavation Areas A-B

Area C	507.75-506.61 m.b.d.	IV	50	Creamy white, compact sandy silt, contains some carbonate concretions, Byzantine, Islamic and post-medieval pottery, as well as other post-medieval material culture, topsoil, boundary to underlying horizon is very clear
	506.87-506.41m.b.d.	IIIa	2000, 2001, 2014	Series of very dark brown sandy silts with few inclusions, both chipped stone and animal bone virtually absent, practically sterile, partially disturbed by roots, boundary to underlying horizon is sharp
	506.73-506.13 m.b.d.	V	2002, 2015	Series of compact light yellowish brown sandy silt layers with frequent chipped stone and moderate animal bone finds, fills in a gully-depression toward eastern part of trench, contains both Pre-Pottery Neolithic, late and early Epipalaeolithic chipped stone artefacts, boundary to underlying deposits is very clear
	506.61-506.39 m.b.d.		2007, 2008, 2009, 2010,	Very dark brown compact sandy clay with infrequent finds (chipped stone & animal bone), not present across the entire trench, highly organic, some rooting, boundary to underlying horizon is clear
	506.33-506.17 m.b.d.		2011, 2016	very dark brown compact clayey silt with frequent chipped stone and moderate animal bone, very thin deposit, moderately clear boundary to lower horizon
	506.29-506.03 m.b.d.		2012, 2023	Dark brown compact silty clay with infrequent chipped stone and rare animal bone, highly organic soil content, very clear boundary to lower horizon
	506.13-505.78 m.b.d.		2022, 2023	Series of loose medium greyish brown clayey silts, finds are very rare, situated above very compact creamy yellowish white sand layer, sharp boundary

Table 6.1b: Summary of stratigraphy in excavation Area C (continued from table 6.1a)

Area D	508.41-507.37 m.b.d.	IV	3000	Compact creamy white, very thick topsoil, matrix of fine silt interspersed with medium large carbonate concretions, rare post-medieval material culture, topsoil, boundary to underlying horizon is moderately clear
	507.51-507.17 m.b.d.		3001	Very compact, cemented, deposit with large carbonate clasts and a matrix of fine silt and small carbonate nodules, contains infrequent chipped stone and animal bone, boundary to underlying horizon is fleeting
	507.37-507.14 m.b.d.	IIIb	3003	Firm mid grey brown silty clay with frequent small carbonate clasts and frequent chipped stone, rare animal bone, boundary to underlying deposit is moderately clear
	507.27-506.81 m.b.d.		3004	Form mid grey silty clay, chipped stone very frequent, moderate frequencies of animal bone, boundary to underlying horizon clear
	507.11-506.75 m.b.d.		3005	Creamy white, very firm deposit, consisting of medium to small sized carbonate clasts with a matrix of silt, contains few chipped stone and very rare animal bone finds, boundary to underlying horizon is moderately clear
	506.99-506.74		3006	Compact dark brown silty clay with numerous small carbonate clasts, moderate frequencies of chipped stone and rare animal bone, boundary to underlying horizon is clear
	506.74-?? m.b.d.	II	3008	Greyish green clay, lacustrine/ lake sediment, sterile

Table 6.1c: Summary of stratigraphy in excavation Area D (continued from table 6.1b)

Section 1	
0 - 28 cm	Hard creamy coloured top soil containing snails and carbonate nodules.
28 - 50 cm	Dark organic sandy soil containing many flint and bone fragments with no clear orientation.
50 - 57 cm	Reddy brown sandy soil containing flint and bone.
57 - 66 cm	Black organic sandy soil containing only rare flint or bone clasts.
66 - 79 cm	Reddy brown clayey silt containing shell (?) fragments (< 1mm).
79 - 91 cm	Greeny grey clay with similar shell (?) fragments.
91 - 103 cm	Deep red clay with similar fragments. This section has 3 desiccation (?) surfaces.
103 - 120 cm	Deep red silty clay with increasing amounts of flint (3-5 cm) towards the base.
120 - 136 cm	Gravel consisting of large flints (~3cm) with a creamy coloured sandy silt matrix.
Section 2	
0 - 40 cm	Hard creamy top soil containing numerous snail shells and carbonate concretions.
40 - 80 cm	Back organic sandy soil containing some large (2-10 cm) flints particularly concentrated locally at the base.
80 - 124 cm	Homogenous dark grey fine sand containing occasional large (10 -15 cm) bone and flint. The top 20 cm contains no large clasts
124 - 140 cm	Numerous angular flints and bone (1 - 10 cm) in sandy silt matrix, with no clear orientation
Section 3	
0 - 39 cm	Hard creamy coloured top soil containing numerous shells and carbonate nodules (2 - 5 cm).
39 - 52 cm	Black organic soil
52 - 95 cm	Dark grey fine sand with occasional flints (~ 5cm). Thins to the west
95 - 128 cm	Numerous angular flints (1-10 cm) and bone in sandy silt matrix with no clear orientation. Rounded basalt balls (10 cm scale) at base
128 - 136 cm	Reddy brown fine sand
136 - 160 cm	Fining upwards sequence of flints (4-8 cm) in creamy coloured fine sand with small 91-2 mm) flint pieces
Section 4	
0 - 30 cm	Friable creamy coloured sandy top soil with numerous snails and carbonate nodules.
30 - 61 cm	Yellowy grey sandy soil with occasional carbonate nodules
61 - 69 cm	Dark organic soil containing numerous flints. (0.5 - 10 cm)
69 - 73 cm	Slightly yellow sandy layer
73 - 75 cm	Dark organic soil
75 - 81 cm	Yellowy clay with some flints (0.1 - 0.5 cm).
81 - 98 cm	Light grey sandy soil with numerous flints (0.1 - 10 cm).
98 - 104 cm	Small (<0.5 cm) flints in clay matrix
104 - 120 cm	Greeny yellow clay with many shell (?) fragments
120 - 137 cm	Deep red clay with shell (?) fragments
137 - 141 cm	Light green sand possible erosional surface at the top.
141 - 146 cm	Large flints orientated NW - SE in light green sand matrix
146 - 155 cm	Green silty clay with numerous flints (2-5 cm).
Section 5	
0 - 63 cm	Greeny grey silty clay with shell (?) fragments. Disturbed by roots and weathering until 52cm. Occasional layers of small (<1 cm) flints @ 60 and 62 cm.
63 - 68 cm	Dark red silty clay with shell (?) fragments.
68 - 96 cm	Greeny grey silty clay with shell (?) fragments. Occasional layers of small flints @ 71, 75, 80 and 90 cm.
96 - 100 cm	flints (1-2 cm) in silty clay matrix
100 - 120 cm	Green clay containing numerous flints (1-5 cm).

Table 6.2: Summary of stratigraphy from sections recorded in the Ayn Qasiyya pool (compare with Figure 6.32)

Laboratory Number	Sample ID	Trench	Context	Strati-graphic Unit	Material	Species	C14 Age	Cal. BP (INTCal 04) 95.4%	Cal. BC (INTCal 04), 95.4%
OxA 18829	#8	Section 1	56	n/a	Charcoal	Amygdalus	17,550 ±75	21,072-20,440	19,123-18,491
OxA 18830*	#8	Section 1	56	n/a	Charcoal	Amygdalus	17,490 ±75	21,004-20,389	19,055-18,440
OxA 18831	#33	A	80	E987/ N1005 (1)	Charcoal	Chenopodi-aceae	17,555 ±75	21,078-20,443	19,129-18,494
OxA 18832	#24	A	60	E987/ N1004 (1)	Charcoal	Amygdalus	17,495 ±70	21,003-20,399	19,053-18,450
OxA 18833	#2009	C	2011	E945/ N995 (1)	Charcoal	Chenopodi-aceae	9,195 ±40	10,49-11,0247	8,542-8,298

**This sample was run twice*

Table 6.3:**AMS radiocarbon dates from Ayn Qasiyya**

was obtained from a context above that of sample #33), strongly suggests that these ought to be highly reliable chronological indicators. Considered together, the dates from Areas A and section 1 put the early Epipalaeolithic occupation at Ayn Qasiyya into the later part of the Last Glacial Maximum, and indeed potentially prior to the hypothesized occurrence of humid episodes during the 19-18kya interval at the end of the Last Glacial Maximum (see Cordova 2007: 157 159, figure 6.1). Sample 8 derives from the black organic marsh deposit situated immediately above the reddy brown clayey silts in section 1 (Unit IIIb; Table 6.3). It therefore dates the onset of the pedogenesis in this area.

GEOMORPHOLOGY

Sedimentary and geomorphological analysis at Ayn Qasiyya was based on the examination of the five sections in the Ayn Qasiyya pool, as well as data accumulated as part of the excavation recording at the site (this work was carried out by Matthew Jones; see Jones n.d.; Jones et al. in preparation; Richter et al. 2007, forthcoming). The sedimentary sequence is described in Table 6.2 and Figure 6.32. Here, only the basic interpretation of the sequence is reiterated. The sedimentary data described above and in Appendix V indicates that the Azraq marshes provided favourable environmental conditions at the time of occupation. The substantial green clayey-silts at the base of the Ayn Qasiyya sequence indicate the presence of a lacustrine open-water setting. This pond or lake can be tentatively dated to shortly after the Middle Palaeolithic given the inclusion of abraded and rolled Levallois Mousterian artefacts into this deposit in section 4. The site was near the edge of this pond or lake, since small- to medium-sized natural flint is occasionally incorporated into this deposit. This suggests that periodic high-energy input occurred, probably as part of a periodic influx of streams or rivers. This episode was followed by a drier phase during which the lake receded or dried out. An oxidized desiccation surface provides evidence for this process. The deposition of further substantial silty clay atop these surfaces suggests a further lake level rise. This body of water appears to have been calm, standing water, with little influx from nearby rivers or streams. Following this, aeolian material was deposited and carbonate concretion occurred in some areas, marking stable land surfaces. These were cut or partially washed away by streams and the lake. Pedogenesis and substantial marsh formation occurred in these inlets and channels. The date obtained from sample #8 and the other charcoal samples suggest an onset for the marsh at around 21,000 cal B.P. At the same time, or shortly thereafter, Epipalaeolithic groups occupied the area, which led to the deposition of substantial material culture and other waste resulting from occupation. Marsh soils are evident in the modern, artificially-maintained, wetland environment in the area. They suggest the continued availability of a steady and plentiful supply of water, as well as substantial vegetation and animal communities. The cutting of further channels appears to have occurred around the same time or shortly thereafter. Immediately prior to 10,000 cal B.P., these channels were filled in by a coarse sandy containing large clasts during high-energy flooding events. This was succeeded by localised erosion, as evidenced by the deposition of PPNB material mixed with earlier diagnostic artefacts in the channels in Area C. One C14 date from this area suggests that this process can be associated with the onset of the Holocene. Following this, the local landscape stabilized, with further marsh formation and pedogenesis, documented by carbonate concretions in aeolian silts and forming the modern topsoil. This sequence and the dates obtained from it has critical implications for our understanding of the local environment, prior to and during the time of site occupation. There is clear evidence for the presence of favourable conditions and plenty of water at the time of occupation. This data, when compared with other palaeoenvironmental records from the region has important implications for our understanding of the Azraq Basin as a marginal environment, and shall be further discussed in chapter 10.

FAUNAL REMAINS

A sample of the Ayn Qasiyya faunal remains was examined by Brittany Thorne as part of an undergraduate dissertation project at the Institute of Archaeology (UCL) in 2007-8 (Thorne 2008). The sample derives from the 3x1 m cut into the archaeological deposits excavated in Area A (see above). Only mammalian taxa were analysed as part of this work, although there is a considerable number of bird remains that should provide potential insights into the seasonality patterns at the site in the future. The assemblage is highly fragmented with many pieces being <2 cm in size, and pose obvious problems for species identification. The assemblage is nevertheless in good condition showing few signs of abrasion or rolling, and the edges of breaks being sharp and appearing fresh. In common with many other sites of a similar date, gazelle is the most common species represented in the sample, potentially belonging to any of the three most common gazelle species in the Levant. A majority of these appear to have been culled as juveniles. This could potentially indicate that the local gazelle population had, on average, a quite young age profile related to the high productivity rate of the local lush oasis setting. Remains of equid were also present, as were relatively high numbers of wild cattle and wild pig/boar. These are somewhat unusual for a site situated in what is often otherwise considered a semi arid to arid environment. However, they are overall more rare when compared to the late Epipalaeolithic site of Azraq 18, where *Bos* and *Equus* were more important taxa (Garrard 1991; Martin 1994). Small mammals include hare and fox. There is a high representation of small mammals in the sample, namely hare and fox, which is unusual for sites of this age. It likely indicates both favourable preservation conditions, as well as the application of the intensive finds recovery strategy. Cut marks were noted on 13 pieces of bone, providing direct evidence for on-site butchering and dismemberment. All body parts of gazelle are well-represented in the sample, suggesting that whole gazelle carcasses were brought to the site and processed. Remains of *Bos*, *Equus* and *Lepus* on the other hand, were mainly represented by head and feet parts. This may indicate that only primary butchering was carried out for these remains at the site, although *Bos*, *Equus* and *Lepus* are considered underrepresented in the sample. Overall, the Ayn Qasiyya faunal assemblage is comparable to that of other sites of the same age in the Azraq Basin. This is despite the inferred wetland conditions at the site, which one could have expected to have resulted in a more dominant representation of *bos* or *equus* in the sample. However, the sample analysed to date is selective and restricted to the material from a small area of excavation that may well reflect other than normal patterns of cultural deposition (e.g., deriving from a special activity zone or being connected to a specific seasonal occupation in some way). At the same time, there is the possibility that hunters at Ayn Qasiyya consciously selected gazelle over cattle and equids. The discrepancy between these scenarios remains to be further examined by future studies in faunal material from other trenches.

HUMAN REMAINS

Within Area B the semi-articulated remains of an individual were first partially exposed during the 2006 season, revealing a cranium, upper and lower mandible in articulation, articulated ribs, and several seemingly semi-articulated long bones (Figure 6.33, 6.34, 6.35, 6.36). Following an extension of the trench in 2007 the remains could be fully exposed, revealing the remains of a largely complete individual. The body position was highly unusual and at first a source of considerable confusion. The torso appeared collapsed with the cranium, lower and upper mandible in articulation, but facing upward and positioned on the chest. Both humeri were alongside the chest, with the left radius and ulna bent at roughly 90° and lying across the pelvic area. The right radius and ulna were situated underneath the femur. The legs were tightly flexed with the femurs spread outward and the knees bent forming a highly acute angle of 10-20° with the tibia and fibula in articulation. The tarsals, metatarsals and phalanges of the feet were curled. The placement of the body therefore resembles a squatting or sitting position. The skeleton was contained within the dark-brown, clayey-silt of the primary marsh deposit and no differentiation in the depositional context between the burial and the surrounding sediment could be discerned. Thus, there is no clear evidence for a burial pit. Taking into account that this marsh deposit is characterized by a constant process of dead plant matter deposition and decay, which results in a homogenous and sequential depositional pattern, a burial pit and its fill should be expected to be easily discernable. The deposits surrounding and underneath the skeletal remains were also inundated with finds, similar to the rest of the deposit across Area B. If this material represents the fill of an indiscernible pit it would have to have been put into the cut without removing any of the cultural waste in it. The marsh sediment beneath the skeletal fragments was thin, and succeeded by a horizon of carbonate-concreted material. Instead of the excavation of a pit, the body's position is interpreted as having simply been placed in the soft, marshy soil of the wetlands. Since the burial was situated just below the interface of the topsoil and the underlying marsh deposit, it appears that interment may have occurred at the very last stage of human occupation at the site. The burial position is highly unusual and the collapsed appearance of the torso, as well as the displaced positioning of the cranium and mandibles, suggests that the upper body was very likely positioned upright during burial, and collapsed as part of the decaying process (see Figure 10.5 for a suggested reconstruction). The position of the tarsals, metatarsals, and phalanges suggests that the legs may have been upright at the time of burial and were only pushed into the current position later on as part of the decaying process. The metatarsals and phalanges appear curled and some are still partially laid down flat, which can only be explained by the feet having been positioned flat on the ground, with the legs correspondingly standing upright in a tightly flexed position. The fibulae were found in articulation with the tibiae, but were situated behind the tibiae. If the legs had been placed flat on the ground at the time of burial one would expect the fibulae to be positioned beneath the tibiae, since they are on the outside. Their position behind the tibiae in the case of the Ayn Qasiyya burial is interpreted as further evidence for a sideways movement of the legs from an upright position. They were pushed into the current position as a result of the sideways and downwards movement when the body was already in a state of partial decomposition. The interpreted upright, sitting position with the legs also positioned upright and tightly flexed to the body can only be considered possible if the body was bound or contained within some kind of cloth. The skeletal remains are strongly suspected to be those of a male between the ages of 35-45 (Jay Stock, personal comment; Richter et al. forthcoming; the anthropological analysis of the remains was carried out by Jay Stock in July 2008). No distinct pathologies are evident. The absence of any stratigraphic disturbance of the sedimentary context, the lack of any intrusive or modern material culture, the lithic industry

Figure 6.33: Area B, human burial

Figure 6.34: Area B, human burial. Details of lower limbs

Figure 6.35: Area B, human burial. Details of collapsed torso and cranium

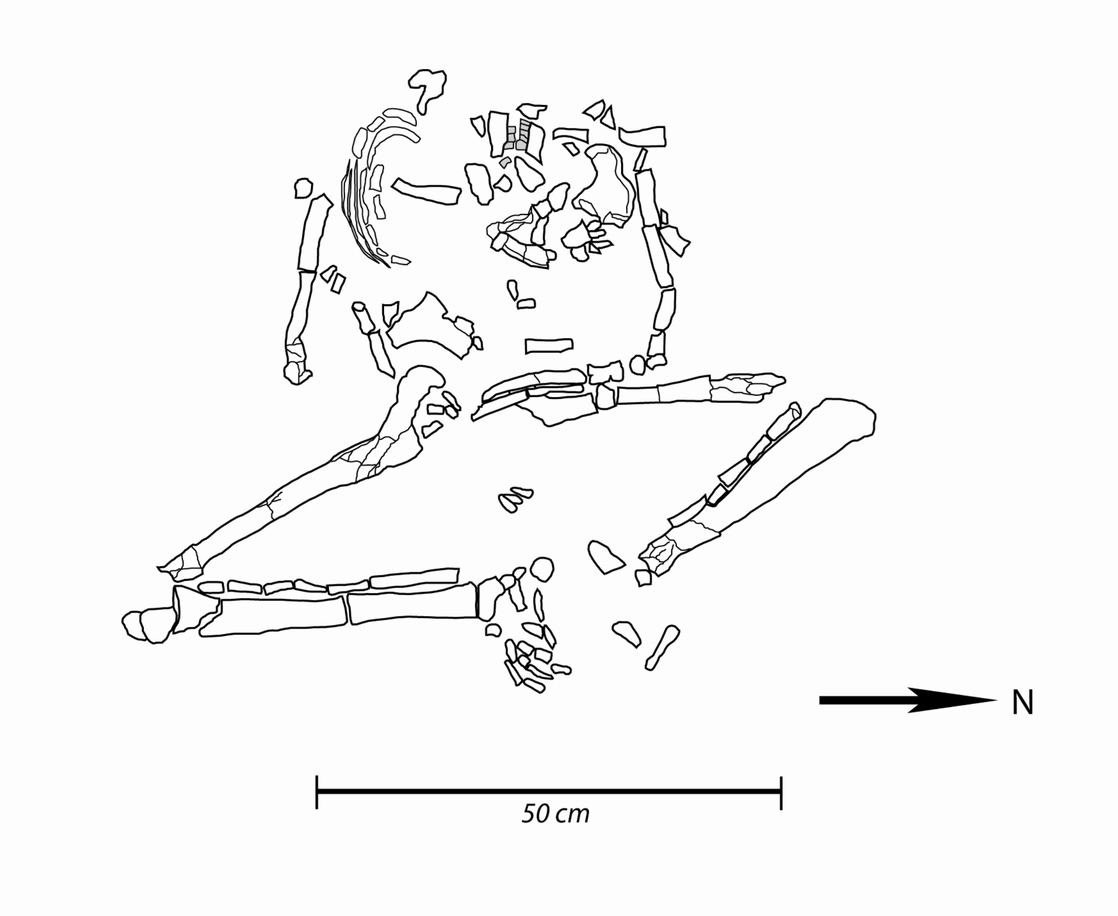


Figure 6.36: Area B, plan of human burial following full excavation.

associated with the archaeological deposit, as well as the absolute radiometric dating of the same deposit in Trench A to ca. 21,000-20,000 cal. B.P. suggests that the burial is of an early Epipalaeolithic date. Complete burials are exceedingly rare in the early Epipalaeolithic (Nadel 1994, 1995), and the Ayn Qasiyya individual represents only the second complete human burial of this time period in Jordan. Across the Levant, only seven complete individuals belonging to the late Upper Palaeolithic and Epipalaeolithic have so far been found.

SITE FORMATION PROCESSES

In this section, I discuss the processes involved in the genesis of Ayn Qasiyya as an archaeological site. As set out in chapter 4, this assessment is crucial to contextualize the further discussions about landscape, human agency, long term patterns, and social interaction. The evidence discussed below suggests that Ayn Qasiyya represents a site that can be considered to be *in situ* to a certain degree, although bioturbation has contributed to the displacement of artefacts to a certain degree. Despite the influence of these natural processes, however, it is argued that the lithic assemblage retains a high degree of integrity that is indicative of past practices, and can therefore be contextualized against the core ideas set out in chapter 3.

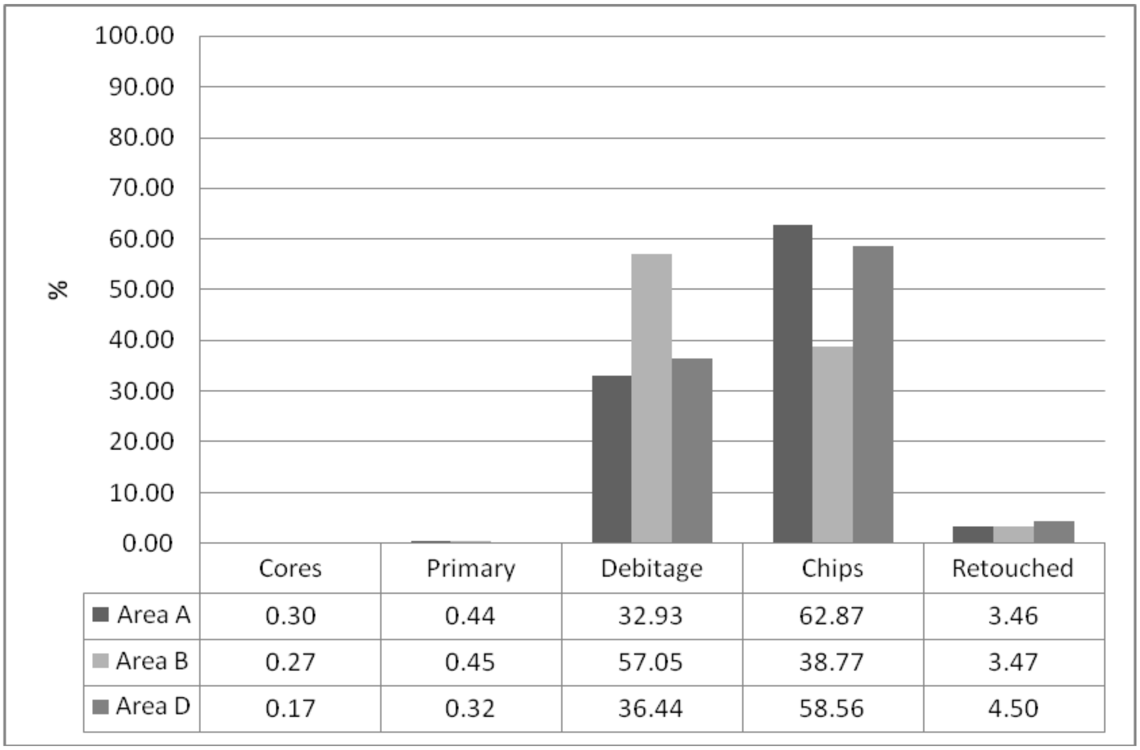
As discussed earlier, the archaeological site at Ayn Qasiyya is contained within a dark-brown, highly organic deposit, which appears to represent a buried former marsh deposit analogous to those continuously forming in the present day wetland reserve (Jones et al in preparation; Richter et al. 2007, forthcoming). It represents the accumulated remains of plants, indurated by water over extended periods of time that underwent pedogenesis under seemingly anaerobic conditions. The absence of large clasts in most of this deposit strongly suggests that it formed in a low-energy environment, within which few lateral movements can be expected to have occurred. However, this deposit would have also been quite soft and muddy, since it was a former reedbed. Disturbance of the archaeological sequence vertically is thus likely to have occurred. Since the deposit has been interpreted as a former marsh deposit, a high degree of bioturbation can be expected to have occurred due to animals and plant growth. While this is unlikely to have caused significant lateral movement, it clearly contributes to a vertical displacement of finds within the deposit. This can be clearly seen in Figure 6.37, where a close-up view of the marsh deposit indicates that artefacts do not show any clear orientation or flat-lying inclination, i.e., they are not lying flat on a former surface. Indeed, the artefact distribution is even throughout the deposits. The excavations have shown that the marsh deposit appears to be situated within shallow depressions between what appears to be raised areas consisting of carbonate-concreted horizons. These may represent former islands or simply the edge of the marshland, between which the marsh deposit was generated. It seems unlikely that a properly developed marsh would have formed a principal occupation area for Epipalaeolithic groups at Ayn Qasiyya, which may go some way to explain the absence of clear archaeological features at the site (such as distinct occupation surfaces or fireplaces). It seems that the accumulation of the archaeological material within the marsh deposit rather reflects sporadic use of this area, combined with dumping or waste disposal as well as limited erosion. Erosion is likely to have been limited since the genesis of the marsh deposit does not appear to have involved high energy events (see above) and because size-sorting and other indicators for erosion could not be discerned.

Given the absence of distinct occupation surfaces, the nature of the material, and the context of its deposition, we can think of the finds as secondary refuse (Schiffer 1987: 58-63). The question that arises, then, is in how far the lithic assemblage, as well as the faunal assemblage from the site, can be considered an indicator of past practices? To address these questions the following paragraphs deal with an assessment of the chipped stone artefacts assemblage to monitor its reliability as an indicator of past human technological practices. The methodology involved in this assessment has been outlined more clearly in chapter 4 and shall therefore not be reiterated here. Since the lithic artefacts are the primary focus in the present thesis, they are the ultimate concern for the present site-formation assessment, although I also make brief mention of the faunal remains analysed by Brittany Thorne (2008). As previously discussed, due to the nature of the excavations at Ayn Qasiyya, certain elements of the standard site-formation process simulation cannot be employed. Excavations in Area A and Area D were restricted to narrow soundings, which provide extremely biased views of spatial composition of the lithic assemblages. Although a somewhat larger area was excavated in Area B, parts of the trench have so far not been accessible for collating the necessary spatial data. This is due to the block-lifting of the human burial in Area B, which although now fully excavated, has not yet permitted the analysis of the lithic or faunal assemblage from the sediment lifted as part of the block. If we consider, for example, the size of the areas and exposures required to adequately monitor spatial re-arrangement of assemblages due to natural processes (Schick 1986), significantly larger exposures are needed to detect statistically-verifiable size sorting of artefacts. The same applies to spatial site-formation studies in Palaeolithic sites in Europe or elsewhere in the Levant, where large and continuous open

Figure 6.37:
Detail of marsh deposit (Unit IIIb) in section 1, showing the unstructured distribution of finds throughout the deposit

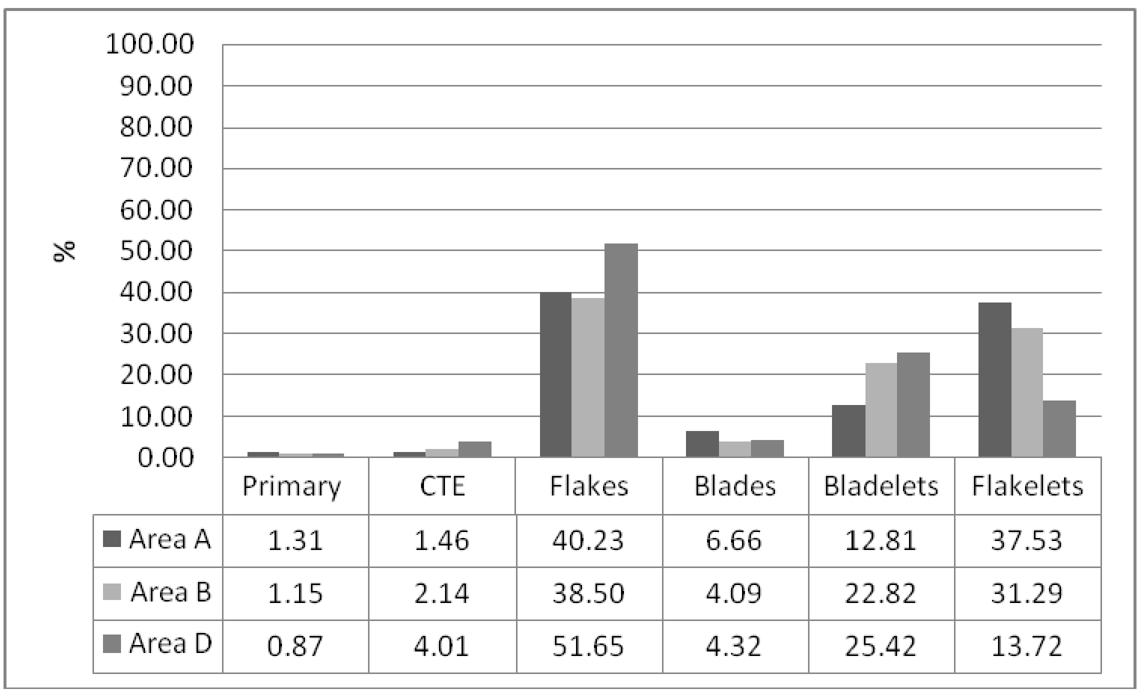
-area exposures have been excavated within which spatial distribution could be feasibly examined. For these reasons, a spatial analysis component for Ayn Qasiyya has to be excluded from the present assessment, since it would undoubtedly produce a biased picture. Area C will also not be discussed as part of this assessment, since the assemblage does not form part of the overall discussion as a result of its highly mixed nature and uncertain date. The material considered here forms a considerable subsample of the excavated material. However, it does not represent the complete assemblage recovered from the site. Material from topsoil contexts, and lower contexts in Area B were excluded. In Area A, I included all material from the eastern sounding. In Area B, I included all material from context 1004, and in Area D all material from contexts 3003 to 3006. This sample is therefore considered substantial enough to provide information on the general nature of the assemblage.

The first starting point with regards to the chipped stone assemblage concerns its techno-typological characteristics. All three excavations areas (A, B and D) produced a lithic assemblage with a strong microlithic character. Although flakes are common amongst the debitage products (Figure 6.38, 6.39), blades/bladelets form an almost equally important component. The retouched artefacts are clearly dominated by variously retouched and backed bladelets, indicating that bladelets were the desired tool blank. The characteristics of the technology and typology confirm an early Epipalaeolithic date by means of comparison with other assemblages both in the Azraq Basin and beyond, i.e., they fit neatly into existing schemes for Early Epipalaeolithic lithic industries (Bar-Yosef 1970; Goring-Morris 1987; Henry 1989; Olszewski 2001b). Remarkably, especially in comparison to Area C, is the lack of admixture of all the assemblages from Areas A, B and D. No diagnostic earlier or later artefacts were found within any of the marsh deposits which have been identified as the principal archaeological deposits at Ayn Qasiyya. Material culture relating to the Byzantine, early Islamic, post-medieval, and modern eras was restricted to the topsoil, but were not found to intrude into the Epipalaeolithic deposits. This suggests a high degree of integrity for the lithic assemblages. If we examine the overall proportions of the assemblage by means of the debitage:core ratios (Table 6.4), gradual differences between the excavation areas are apparent. Area A has the lowest debitage:core ratio, while Area B and D have a more comparable ratio. This data is somewhat skewed, since for Areas A and D several contexts were amalgamated and core numbers remained exceedingly low in some contexts. While these contexts show subtle differences in terms of the stratigraphy, this amalgamation is nevertheless justifiable because the sedimentary formation processes involved in the genesis of these deposits is exactly the same (they are all marsh deposits, Unit III, see above). What is apparent then



	Cores	Primary	Debitage	Chips	Retouched
Area A	0.30	0.44	32.93	62.87	3.46
Area B	0.27	0.45	57.05	38.77	3.47
Area D	0.17	0.32	36.44	58.56	4.50

Figure 6.38: Major artefact classes in the Ayn Qasiyya lithic assemblage, split according to excavation area (in %; Area A, n=8,867; Area B, n=10,013; Area D, n=21,118).



	Primary	CTE	Flakes	Blades	Bladelets	Flakelets
Area A	1.31	1.46	40.23	6.66	12.81	37.53
Area B	1.15	2.14	38.50	4.09	22.82	31.29
Area D	0.87	4.01	51.65	4.32	25.42	13.72

Figure 6.39: Debitage class sub-divided into major artifact classes (in %; Area A, n=747; Area B, n=4158; Area D, n=7,949)

is that in all of the three early Epipalaeolithic excavation areas, cores are significantly outnumbered by debitage, despite the difference in excavation localities (Area D is somewhat upslope of Area A and B). This would suggest that size sorting is not the primary factor that produced the assemblage; rather we are dealing with a technological pattern. This impression is corroborated by the low number of primary pieces of debitage present in the assemblages, as well as the characteristics of the cores themselves. The lack of primary elements strongly suggests that initial core reduction did not take place at the site (more details with regards to the *chaîne opératoire* are discussed in chapter 8). There is no reason to assume that primary flakes should be underrepresented due to size sorting caused by erosion or fluvial activity, since other debitage products of the same or a comparable size are present in the assemblage. In addition, many cores found at the site appear exhausted, which suggests their discard only after they had outlived their use. A final indicator of intentionality is provided by the relative densities of artefacts within the archaeological deposits (Table 6.6). Generally speaking, the densities in the archaeological deposits at Ayn Qasiyya are high, with the lower part of the sequence in Area D and context 60 in Area A showing a density spike. The lowest density is apparent in the lowest part of the sequence in Area A, while densities in the upper to mid-sequence in Areas A, B and D (contexts 22, 1004 and 3003) are relatively comparable. The low density in Area A (contexts 80, 81, and 82) likely reflects the initial stage of occupation at the site. This deposit is situated right above the lake sediments and represents the initial pedogenesis and build-up of the marsh deposits. Artefacts in this layer are likely to have derived from the deposit above, and while they may reflect vertical displacement, they are unlikely to relate to significant disturbance or horizontal displacement.

Other differences in densities appear to more directly reflect the intensity of occupation rather than indicating particular disturbances. There are no areas or sedimentary units where a total lack of artefacts is apparent, apart from the sterile lake sediments below Unit II. Artefact size has been identified as a further valuable indicator for post-depositional disturbances in archaeological sites (Schick 1986). Two measures of debitage size can be discussed with regards to the Ayn Qasiyya assemblages. Initial sorting differentiated between chips/chunks, flakelets, and other forms of debitage (flakes, blades and bladelets, for definitions see Appendix II). Chips were defined as pieces of debitage less then 10 mm in diameter and are commonly seen as accidental by-products or shatter deriving from knapping activities (Bulmer & Downer 1989; Bulmer & Davis 2004; Fladmark 1982; Hull 1987; Patterson 1983; Schick 1980, 1986, 1987b; Schick & Toth 1993). Flakelets can often be related to more specific knapping activities of core preparation or maintenance, such as debitage resulting from ridge preparations or plat-

	Tool : core	Debitage : core	Debitage : Tool
Area A	11.44	108.88	9.52
Area B	12.86	211.59	16.45
Area D	25.74	208.34	8.10

Table 6.4: Ayn Qasiyya lithic assemblages ratios

	CTE : Core	Flake : blade/ bladelet
Area A	1.60	2.07
Area B	3.07	1.43
Area D	8.39	1.74

Table 6.5: Ayn Qasiyya lithic assemblage debitage ratios

form and ridge grinding (Fladmark 1982; Odell 1989; Sullivan & Rozen 1985). As can be seen from Figure 6.38, both chips and flakelets are very common in the assemblages from all three excavation trenches. They are especially highly represented in Area D (more than double the chips and chunks than in the other trenches). Flakelets are more uniformly represented in all three trenches. The presence of these very small fragments presents a strong indication of the lithic assemblage's coherence. Indeed, the presence of these tiny fragments suggests that knapping took place at or near the trenches. It further suggests that fluvial disturbance is very unlikely to have occurred, following Schick's (1986: 91, figure 6.2) model for assessing the *in situ* character of archaeological lithic assemblages. If fluvial disturbance would have affected the assemblage debitage of less than 20 mm in diameter should be represented only in low quantities. Figures 6.40, 6.41 and 6.42 show the cumulative percentages of debitage sizes from the different excavation areas and associated archaeological contexts. These indicate that the majority of debitage is 3-5 cm in size and there is a predictable drop in frequency as debitage size increases[8]. These graphs are very comparable to those presented by Schick (1986: 286-287, 289, 290, 292-296, 298)[6] for largely undisturbed sites. Although there are significant technological differences and constraints to consider with respect to Schick's assemblages and Ayn Qasiyya, her experiments nevertheless provide a baseline for assessing post-depositional disturbance at Ayn Qasiyya. If fluvial activity had any influence on assemblage composition at Ayn Qasiyya one would expect a significant dip in the graphs reflecting a removal of smaller debitage from the sample. A comparable graph indicating such a disturbance is provided by Schick's experimental site 21 (Schick 1986: 291). The Ayn Qasiyya cumulative data presented here therefore appears to suggest that there was little

6: Pieces <2cm are not shown, as they were already recorded as 'flakelets' in the overall sorting significant removal of small debitage from the assemblages and further corroborates the data derived from basic artefact sorting, categorizing and counting.

Damage, as well as physical and chemical surface alteration of lithic artefacts, is a further indicator of post-depositional disturbances of an archaeological site. Their genesis and relation to site disturbance is well understood and has long been used to assess the integrity of archaeological lithic assemblages (Burroni et al. 2002; Hurst & Kelly 1961; Levi-Sala 1986; Luedtke 1992; Schick 1986; Schiffer 1987; Schmalz 1960a; Schmalz 1960b; Shackley 1974; Stapert 1976). Data relating to these events can be easily observed and recorded as part of the lithic analysis. Figure 6.43 presents this data from Ayn Qasiyya and clearly suggests that the assemblage is overwhelmingly composed of undamaged and unaltered artefacts. Well over 80% of the assemblage consists of fresh artefacts, i.e., pieces which have sharp edges and fresh ridges showing no signs of rolling or abrasion. Burnt pieces generally form less than 10% of the overall assemblages (11.52% in Area B), which may relate to both natural and intentional fires. Artefacts which are re-patinated do also occur in some trenches, albeit in very low frequencies. Correspondingly, no significantly rolled or abraded artefacts were found. This data clearly suggests that the assemblage has been unaffected by either rolling induced by fluvial transportation or erosion, nor by long term exposure which could have caused pits, sheen (induced by sand blasting) or re-patination (indicating a chemical reaction). The lack of patination and other signs of long-term, open-air exposure would suggest that the site was likely buried relatively fast in a low energy environment.

In addition to the sedimentological characteristics of the deposits at Ayn Qasiyya and the composition analysis of the chipped stone artefact assemblage a few other indicators help in evaluating the integrity and coherence of the lithic assemblages. The human burial found in Area B provides further evidence for better understanding and assessing the *in situ* character of Ayn Qasiyya, at least in Area B. As discussed above, the burial was found largely in full articulation, with only the cranium, mandibles, humeri, ulnae, and radii showing signs of displacement. This suggests little post-depositional disturbance, especially when considering that the displaced bones probably result from an original interment position with the torso sitting upright. The body was, however, inserted into the sediment toward the upper terminus of the marsh deposit at the interface with the topsoil. This would therefore indicate only a lack of significant disturbance toward the latter part of the sequence, but not potential disturbances that occurred earlier, creating the base of the archaeological deposit. The fact that a largely intact burial was found in the deposit suggests that this deposit was stable and undisturbed for extended

	Context	m3 Volume excv.	# of lithic artefacts	Density per m3
Area A				
	22	1.14	3732	3273.68
	60	0.27	1821	6744.44
	80, 81, 82	0.96	825	859.38
Area B				
	1004	2.82	7417	2630.14
Area D				
	3003	2.812	6675	2373.76
	3004	0.81	7818	9651.85
	3006, 3008, 3009	0.76	4679	6156.58

Table 6.6: Approximate densities of artefacts within each area and archaeological context

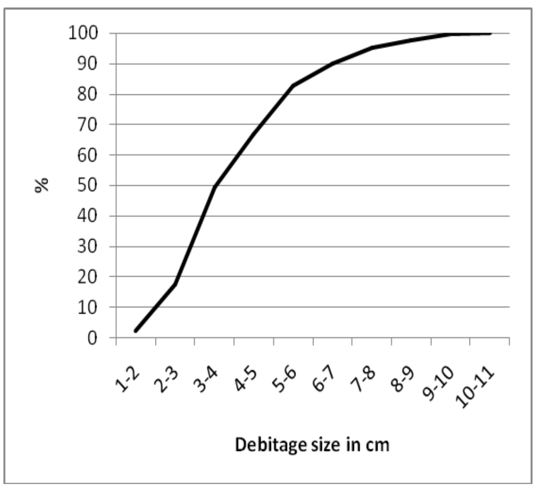


Figure 6.40: Cumulative Percentage graph showing debitage size in Area A (n=226)

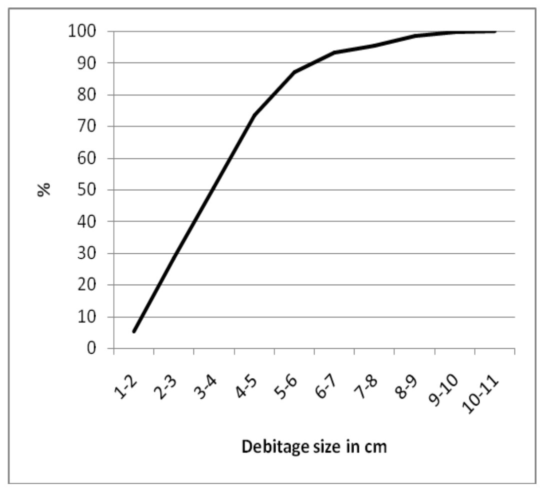


Figure 6.41: Cumulative percentage graph of lithic debitage size in Area B (n=268)

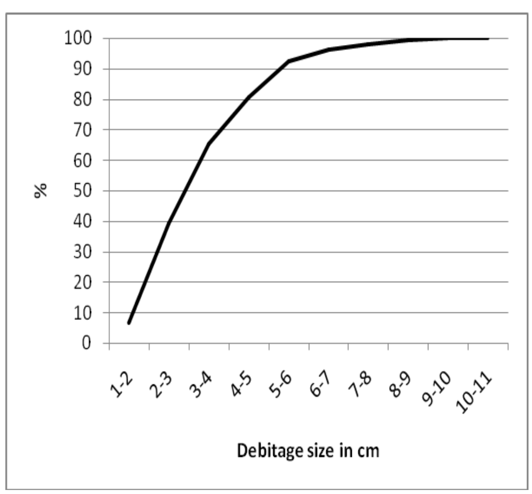
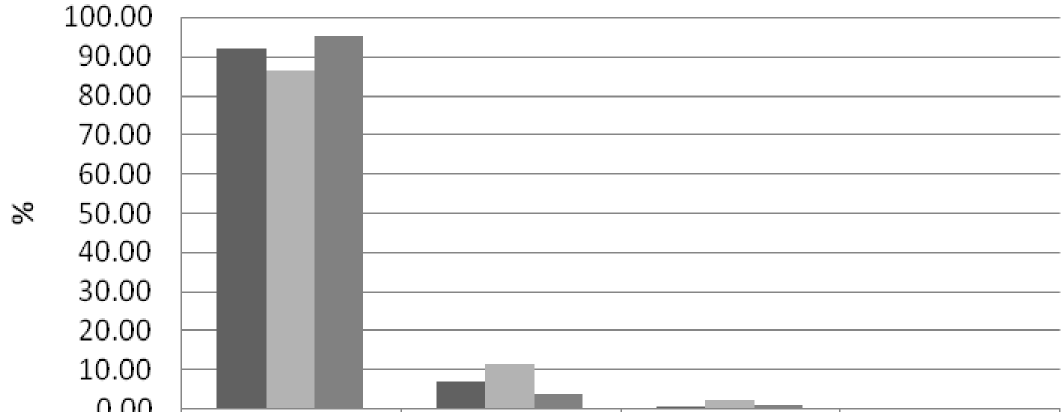


Figure 6.42: Cumulative percentage of lithic debitage size in Area D (n=439)



	Fresh	Burnt	Patinated	Rolled/ Abraded
A	91.96	7.14	0.89	0.00
B	86.25	11.52	2.23	0.00
D	95.10	3.85	1.05	0.00

Figure 6.43: Condition of debitage pieces in Areas A, B, and D (in %, Area A, n=224' Area B, n=269; Area D, n=571)

Figure 6.44: Area B, detail of articulated tarsals indicating the undisturbed nature of the deposit.

periods of time and lends credence to the other available data suggesting the coherency of the site's assemblages. Figure 6.44 shows a series of articulated metatarsal and phalange found within context 1004 in Area B. A similarly articulated series of vertebras was also observed in Area D. This further corroborates the character of the marsh deposit as a largely undisturbed, low energy impacted burial environment. Preliminary analysis of the faunal assemblages in Areas A and B (carried out by Brittany Thorne, 2008), also supports this interpretation. Thorne's (2008) analysis showed that the faunal remains had fresh breaks with sharp edges. The fragmented state of the bone assemblage is more a result of past processing activities then post-depositional processes. Lastly, charcoal recovered from the deposits in all trenches is in some cases exceptionally well preserved. All AMS dates (see above) produced highly coherent and fitting results. Since the dates are stratigraphically ordered and fit very well with the techno-typological characteristics of the chipped stone assemblage, they further indicate that no disturbance of the deposit appears to have occurred.

Multiple lines of evidence acting as proxy for the assessment of the site-formation processes of the archaeological deposits at Ayn Qasiyya strongly suggest that the marsh deposits associated with the principal archaeological assemblages represent a largely undisturbed archaeological deposit. Fluvial activity appears to have had little to no impact on the composition of the recovered assemblages, since even small fragments of chipped stone and fauna are preserved. The composition of the assemblage as well as the size of the debitage from all excavation areas is strongly correlated with data derived from experimental sites with little or no disturbance (Schick 1986). The underrepresentation of certain elements within the lithic assemblage conforms more directly to technological parameters, and thus human practice, rather than resulting from natural processes. Judging from the condition of the assemblages, post-depositional exposure of artefacts appears to have been relatively brief and that the site was buried in a relatively short period of time. Nevertheless, the site appears to preserve no strictly *in situ* occupation areas. Archaeological features could not be discerned during excavation and intact occupation surfaces were not found. This is likely related to two issues. One, post-depositional modification of the deposit occurred as part of bioturbation within the marsh deposit. A marsh is a biologically highly active environment, and thus plant growth and animal activity have caused significant, albeit localized, vertical and some limited lateral movement. While this undoubtedly had an impact on the vertical and horizontal spatial arrangement of the assemblage, it does not appear to have disturbed the assemblage significantly enough to render it useless to further analysis. However, mixing of artefacts between archaeological horizons appear to be a distinct possibility and has to be carefully monitored when discussing typologically-indicative chronological patterns in the lithic assemblages (see chapter 8). On the basis of the above discussion it can nevertheless be argued with sufficiently high confidence that the Ayn Qasiyya lithic assemblages represent a coherent, undisturbed palimpsest, sufficiently intact and complete from which to investigate and interpret archaeological patterns.

SUMMARY

The three excavation seasons conducted at the site between 2005 and 2007 have provided vital information regarding the use of the Azraq Oasis by final Pleistocene hunter-gatherer communities. The initial occupation of the site occurred shortly after the genesis of a marshland following the disappearance of a lake that formed prior to the latter part of the LGM. Chipped stone artefacts recovered in low quantities from Area A were found immediately above the lacustrine sediments and are associated with two radiocarbon dates which are tightly clustered around 21,000 cal B.P. This places the emergence of the marshland into the latter part of the LGM and strongly suggests that local conditions were wetter than often expected in more general climatic reconstructions (Jones *et al.*, in print). The stratigraphic sequence observed in Areas A, B and D is very comparable, with a general succession of sterile lake sediments, followed by marsh deposits in which the archaeological site is contained, sealed by cemented topsoil consisting of carbonate concretions and aeolian silts. Area C shows an altogether different sequence, which is more directly associated with early Holocene events. One AMS date from this trench produced an eleventh millennium date, which suggests that the majority of deposits in this trench were laid down at the very beginning of the Holocene and shortly thereafter. This is in principal confirmed by the chipped stone artefacts recovered from this trench, although they represent a highly mixed assemblage. With diagnostic early and late Epipalaeolithic artefacts present, as well as typical PPN projectile points and other artefacts, the Helwan, Byblos and Jericho points provide a convincing PPNB *terminus ante quem* for the material in this area. Artefact assemblages recovered from Areas A and B, on the other hand, display a high degree of similarity in their technological and typological characteristics, whereas the assemblage from Area D is significantly different. These differences will be addressed more directly in chapter 8. The occupation of the site has, however, been subject to some post-depositional modification. Apart from the evident erosional character of Area C, bioturbation of the marsh deposits in Areas A, B and D has contributed to vertical and limited horizontal displacement of artefacts, making it difficult to identify occupation surfaces or any spatial patterning to the archaeological assemblages. Judging from an assessment of the technological properties, the size categorization and condition of the lithic assemblage, in conjunction with sedimentological and related lines of evidence, it can nevertheless be ascertained that the lithic assemblages from Areas A, B and D represent a coherent and integral set of materials. The material is overwhelmingly in good condition and proportionally balanced with regards to size and elements present, so that significant disturbance of the assemblages can be negated. They can therefore be used to analyse and discuss the technological practices of early Epipalaeolithic communities that visited Ayn Qasiyya. Nevertheless, one has to be careful with regards to vertical phasing of the lithic assemblages, especially with regards to Area D. This will be discussed in more detail in chapter 8.

I have suggested that the areas thus far excavated at Ayn Qasiyya are unlikely to represent a primary area of occupation and that the majority of the archaeological material recovered consists of what can best be understood as secondary refuse. Judging from the characteristics of the marsh sediment, one can assume that this kind of land surface would have been a fairly muddy, swampy area, which is difficult to conceive of as a primary occupational zone. This view is supported by the absence of obvious signs of hearths, occupation surfaces or other archaeological features. The only integral structural element is the human burial found within Area B. This seems to suggest that we are dealing with either material that has nevertheless been slightly transported into its present location, deposited where it was found by throwing it away, or a combination of both. A further possibility may be that the sediment was transformed by bioturbation so that occupation surfaces and other features have been disintegrated to such a degree that they simply cannot be detected. In some areas it appears that a carbonate-concreted horizon underlies the marsh deposits (such as at the eastern edge of Area B and the western edge of Area A), which displays a gentle upward incline. This suggests the presence of formerly stable land surfaces interspersed with channels or inlets in which water was present and marsh sediments built up during the later part of the LGM. Analogous islands can be seen in the modern southern Azraq marshes today. Such areas would lend themselves more readily to human occupation then the swampy and muddy marsh. It would seem possible then that the original occupation was situated on such raised bits of land, but that either the occupation has since slightly washed into the former inlets and channels, or that material was deliberately thrown away and deposited here. Be this as it may, the evidence strongly suggests that the recovered assemblages preserve a high element of their *in situ* character. Especially with regards to the human burial it can be suggested that direct evidence for past human practices is preserved.

Judging by the presence of archaeological sediments and the distance between the excavated trenches, one can tentatively estimate the minimum size of the occupation to lie in the range between 500-700 m^2. This is well in line with other sites of a comparable date elsewhere in the southern Levant, although it is considerably smaller than some of the massive mega-sites in the Azraq Basin (see chapter 5). How much time is compressed within the occupational deposits at Ayn Qasiyya is difficult to judge, however. The tight clustering of the AMS dates from Area A would suggest that the deposition occurred within a restricted period of time. The condition of the lithic assemblages, lacking re-patination, desert sheen or pits induced by wind blasting, would also suggest rather fast-paced burial. This seems conceivable in an environment such as wetlands where biomass production rates per square metre are very high, resulting in a fairly rapid rate of soil accumulation. A more detailed discussion as to what Ayn Qasiyya represents as an occupation site shall be omitted for now, since such an assessment also has to be based on the inventory of lithic artefacts from the site. For now, it is important to point out that Ayn Qasiyya is well suited to address the questions and issues set out in the earlier discussion of this thesis. The site adds further evidence to our understanding of the final Pleistocene occupation of the Azraq Oasis and the Azraq Basin as a whole, and allows us to further discuss the issues of marginality, landscape and questions of social evolutionary narratives set out previously. The human burial from the site clearly indicates the importance of this location to early Epipalaeolithic groups, and this issue will be discussed in more detail below with regards to memory construction and the social creation of places in the landscape, in addition to a more detailed discussion also related to technological practices.

Chapter 7:
Survey and Excavations at AWS 48

INTRODUCTION

This chapter summarizes the surveys and excavations at AWS 48. Compared to Ayn Qasiyya this site is of quite a different character. It is located ca. 1.9 km southeast of Ayn Qasiyya in an area dominated by silt dune and spreads over approximately 14,000 m^2 (Figure 5.5). In the initial Azraq Wetlands Survey Rollefson described it as a series of thirteen separate loci of dense surface scatters of lithic artefacts (Rollefson n.d.). These are located between two outflow channels from the former marshes to the mudflat situated to the southeast and east. The area can therefore be considered a boundary zone between the marshland proper and the seasonally-flooded mudflat. The accumulated silt dunes in the area appear to have a certain degree of antiquity, as the sites are contained within them. However, this assessment is problematic, since historic pottery (Byzantine and Islamic) and musket bullets were also found atop and between the dunes. Shrub vegetation dominates the area today creating the impression of a flat and somewhat bleak landscape (Figure 7.1, 7.2, 7.3). The lithics suggest a Middle Epipalaeolithic date for the site (see chapter 9). While other surface lithic scatters have been found in other parts of the Azraq Basin, AWS 48 represents an interesting archaeological case. With approximately 14,000 m^2 in maximum extent, this is not a small site; although the area estimation does not reflect the considerable variability in surface densities across this space. Nevertheless, in comparison to other Middle Epipalaeolithic sites, AWS48 is clearly of considerable extent, which appears to reflect the intensive use of this particular portion of the Azraq wetlands for considerable periods of time. The site is furthermore interesting as it appears to represent a shift in the use of the landscape by Epipalaeolithic communities. Whereas the focus of settlement was near the copious springs during the early Epipalaeolithic, during the middle Epipalaeolithic the southeastern silt dunes have seemingly become the primary focus. Was there a particular reason for this shift, or, does it simply reflect a gradual change in the way the Azraq Oasis was used by hunter-gatherers during the Middle Epipalaeolithic?

METHODS

To quantify and map the surface scatters comprising the site of AWS 48 a 5x5 m grid system was laid out across the site, using the arbitrary datum of East 500/North 500

Figure 7.1: The southern silt dune landscape in the Azraq Wetlands Reserve where AWS 48 is located

and 516.00 meters above sea level. This grid system was then used as the basis of a surface count of all visible lithic artefacts larger than 5 cm in each 5x5 m square. The methodology catered for both a reasonably accurate quantification of the surface material, as well as mapping a fairly extensive area within a constrained period of time (Kvamme 1998). In addition, the area's topography was mapped using a total station, to compare surface artefact densities with the distribution of silt dunes. The aim was to investigate whether surface distribution was contingent on the present-day extent of silt dunes as a potential limiting factor for interpreting lithic artefact densities. A piece-plotting survey was conducted at one cluster over the course of two weeks in August 2007 and involved the measurement of all pieces visible on the surface and larger than 2 cm using a Leica TC407 total station. This time-consuming, but detailed, procedure aimed to create a record of the spatial distribution of the artefact concentration prior to excavation and to establish a basic spatial distribution model with which to monitor site-formation processes and reveal any intra-site spatial structure. A coding system distinguishing three basic artefact types (cores, flakes and tools) was used to create a basic subdivision of the points data. The survey was not exhaustive and its limits were mainly dictated by the time constraints imposed by the length of the field season. An area of 26 m by 12 m or 186 m^2 was surveyed. Based on the identification of particularly dense clusters of artefacts, as part of the 5x5 m surface density characterization, several locations were selected as targets for collection and excavation. Excavation aimed to verify the presence of subsurface deposits and confirm the depth of archaeological deposits. Three locations were selected for excavation, employing the same methodology as at Ayn Qasiyya (see above). From other locations lithic samples were collected for reference and to provide a means of relatively dating the site on typological grounds (Figure 7.5). One surface cluster (AWS48.1) was subjected to an extensive surface collection since a modern track ran through it. Surface collections were made using trowels and hand shovels, scraping off the very loose silty topsoil and sieving the material through hand-held 2 mm sieves, to ensure high degree of artefact recovery. This was required due to the low visibility of the often white coloration of the chipped stone due to re patination, and the creamy white colour of the silt sediment in the area of the site.

Figure 7.2: AWS 48 surface density of lithic artefacts at cluster 3

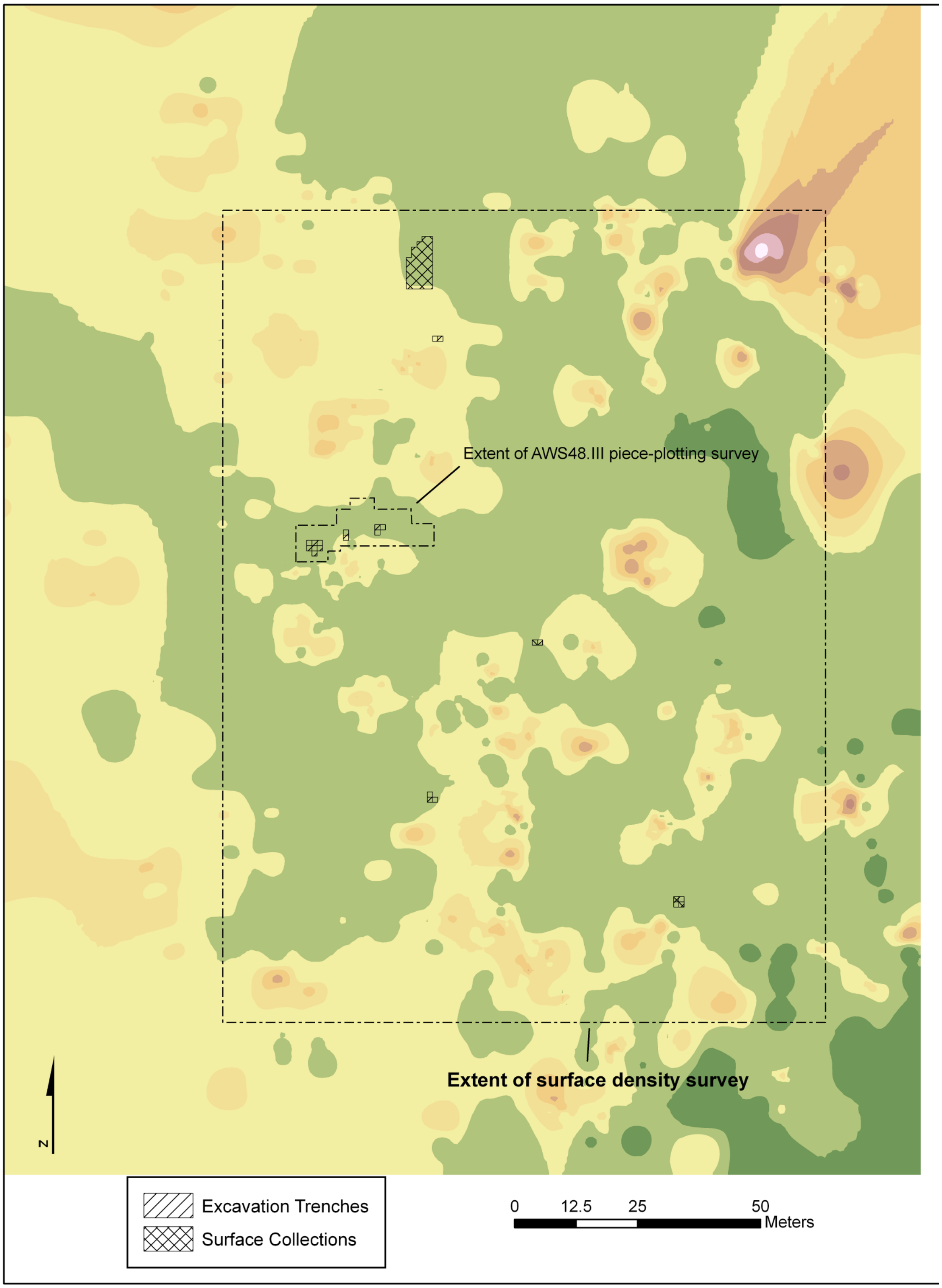


Figure 7.3: Topographic map of AWS 48, showing the extent of the density and piece-plotting syrvey, as well as locations of excavation trenches and surface collection areas.

Figure 7.4: AWS 48 density survey results. Dark areas indicate higher concentrations of chipped stone artefacts per 5x5m area.

Figure 7.5: Inverse-distance weighted, nearest-neighbour calculation of density survey at AWS 48, showing six distinct clusters of chipped stone artefacts.

Figure 7.6: Excavations at AWS48.III, August 2007

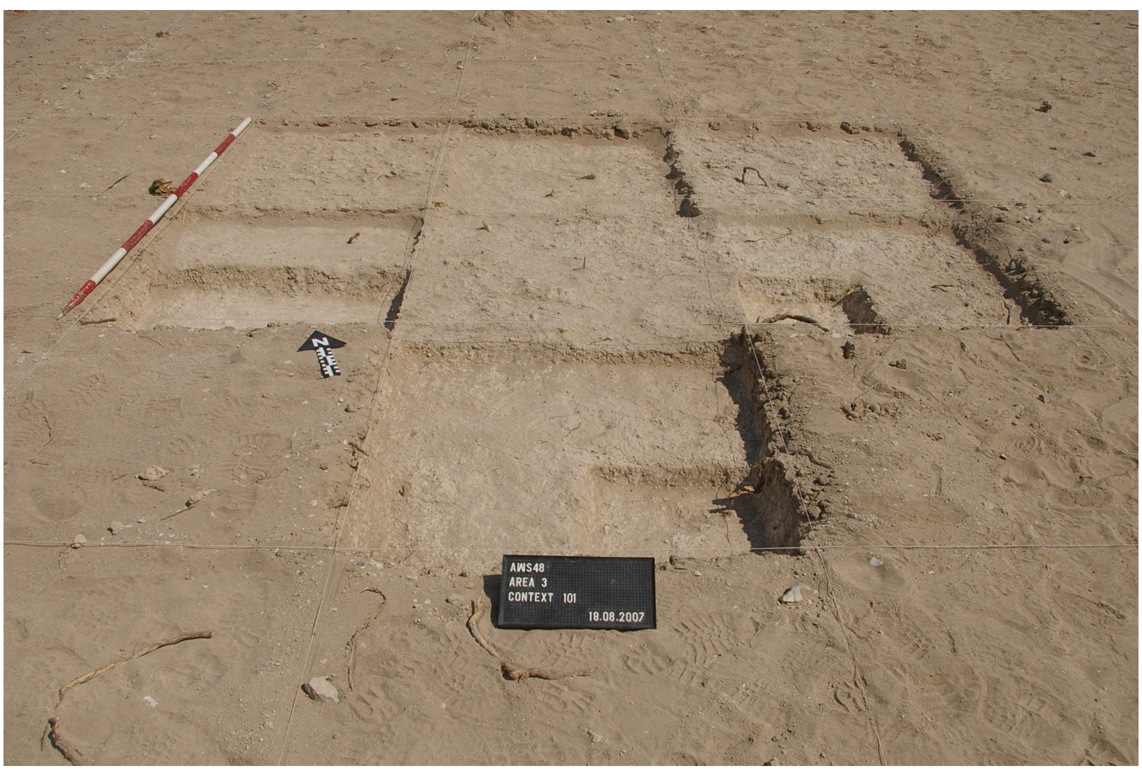


Figure 7.7: Main excavation area at AWS48.III excavated to vigin soil, August 2007

SURFACE SCATTER SURVEY

The surface scatter density survey resulted in the definition of six distinct clusters. The densest clusters contained between 500-600 artefacts within a 5x5 m area. The surface density survey by 5x5 m cell count is shown in figure 7.4. Shown in dark-grey is a plan of the number of high density areas. Using a nearest neighbour or spline function in ArchGIS this distribution was interpolated to model the density of artefacts across the area. This reveals 6 distinct clusters with high densities of surface artefacts (Figure 7.5). Of the six clusters, #3 appeared as having the highest overall density. It is notable that these clusters are particularly prominent in areas with lower elevation, whereas the silt dunes are virtually void of artefacts. It appears that Clusters 1 and 2 may represent part of the same cluster interrupted by a silt dune. Clusters 3 and 4 also appear somewhat continuous; while clusters 5 and 6 are more obviously discrete. All clusters are nevertheless quite clearly defined, measuring on average between 100 and 300 m^2.

STRATIGRAPHY

Excavations were conducted at clusters 1, 3 and 5 to verify the existence of subsurface deposits and document the depth of the archaeological sequence (Figure 7.6 and 7.7). In cluster 1, excavations were conducted to test whether artefact scatters occurred beneath silt dunes and could thus be considered to be far more extensive then indicated by surface distribution. Since Cluster 3 represents the densest artefact scatter in the study area it was subjected to the most extensive excavations, totalling 12 m^2 in size. 2 m^2 was excavated in Cluster 1 (in addition to extensive surface collections), whereas 3 m^2 was excavated at Cluster 5. Excavations in all three clusters revealed a very comparable shallow stratigraphic succession. The majority of the artefacts were contained in the very loose topsoil silts, extending ca. 1 -20 cm below the surface (Figure 7.8 and 7.9). Beneath was increasingly indurated silt cemented by carbonate concretions. Artefact densities dropped very rapidly and only very few lithics were found in this deposit. These showed no orientation and appeared pushed into the sub soil. Apart from artefacts no other traces of anthropogenic activity were detected. Excavations in cluster 1, where a silt dune was partially cut, revealed that artefacts were also found below the dune. Thus, the distribution of artefacts as visible on the surface is skewed since some of the silt dunes mask the full extent of the artefact scatter (see below). The nature of the archaeological deposits indicates a predominance of aeolian deposition at the site. The fine silts and silt dunes at the site are a clear result of wind derived accumulation. The carbonate concretion occurring below this suggest weathering processes occurring over extended periods of time, during which this area must have represented a stable land surface. It appears that the silt dunes may be of some antiquity, although it cannot be ascertained in how far their deposition can be seen as indicative of the palaeoenvironmental processes at the time of occupation at AWS 48.

FINDS

Figure 7.8: West section in AWS48.III showing the shallowness of the archaeological deposit

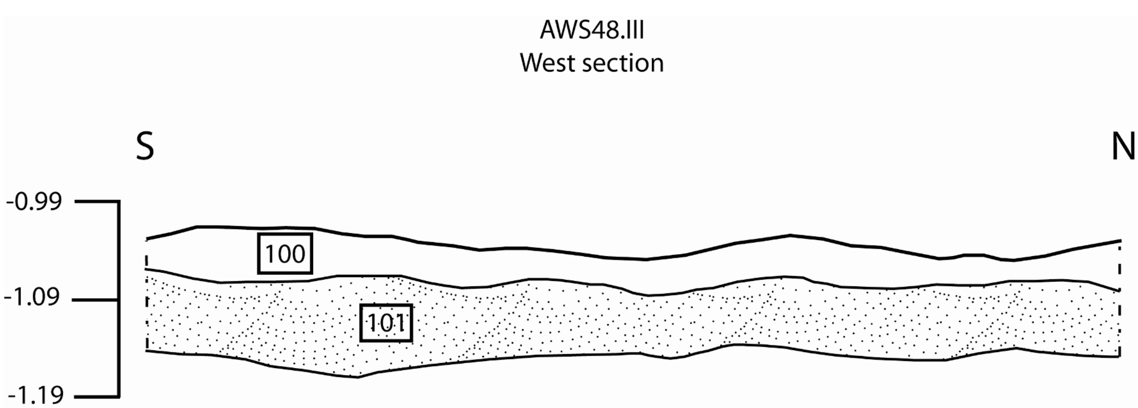


Figure 7.9: AWS48.III, drawing of west section

The vast majority of finds from AWS 48 consist of chipped stone artefacts, which total more than 50,000 individual pieces. These will be discussed in more detail below, as well as in chapter 9. Faunal material is not preserved, since the site is very shallow and exhibits clear signs of having been exposed for a considerable period of time. This has undoubtedly led to the decay of any organic remains. Likewise, no charcoal was identified in any of the excavated areas. Cluster 1 did produce a number of small limestone beads. These are ca. 10 mm in diameter with a small hole in the centre, with a thickness of 2.5-5 mm. Although similar stone beads are not unknown at other middle Epipalaeolithic sites, they also resemble PPNB stone beads found across the Azraq Basin (Wright and Garrard 2002). Their chronological affinity is therefore difficult to clarify.

SITE-FORMATION PROCESSES AND SPATIAL DISTRIBUTION

In this section the question of how much integrity the lithic assemblages from AWS 48 have is approached using a four-fold approach. In contrast to Ayn Qasiyya, the nature of AWS 48 and the kind of work carried out at the site, lends itself more readily to a spatial analysis of lithic artefact distribution to model the impact natural processes might have had on the formation of the assemblages (see also discussion in chapter 4). Thus, three scales of spatial analysis can be drawn on: the data derived from the surface density count, the piece-plotting of individual artefacts at AWS 48.III, and the spatial cell frequency data collected from the excavations at AWS 48.III. This provides three scales of analysis to detecting any significant disturbances within the clusters or any spatial structure to the distributions.

SPATIAL DISTRIBUTION

The nearest neighbour analysis carried out using ArchGIS and depicted in Figure 7.5 clearly indicates the spatial coherence of the six clusters initially identified as part of the surface density characterization (Figure 7.4). This, and plain visual inspection, indicates that the distribution is not random. Indeed, a surface area of between 100-300 m^2 for each cluster is within the expected values for a short-term camp as known from ethnographic case studies (Binford 1983: 149-165; Gould & Yellen 1987; Hayden 1979; Hitchcock 1987; Spurling & Hayden 1984). Without wanting to apply a direct analogy, ethnographic information nevertheless serves as a means to verify whether we can consider these scatters as outcomes of human activities. Examining the distinctiveness of the scatters in relation to their size indicates that the densities drop off quite dramatically the further away one gets from the centre of each cluster. These are distinct localities with high densities of artefacts that are spatially separated in most cases. There does appear to be some potential continuity between clusters 1 and 3, represented by cluster 2 in between. This also corresponds with a raised area here, which may indicate that silt dunes have covered part of the distribution. There also appears to be some continuity between clusters 3 and 4, since cluster 3 has a ‘tail’ extending towards cluster 4. The area in between cluster 3 and 4 with lower densities has, however, a low elevation so that the lack of artefacts here cannot be explained by a silt dune overburden. Instead, this area may well represent an area where fluvial disturbance occurred, or may instead reflect the actual difference in past site use. The data obtained by means of the survey does not appear to verify sufficiently either hypothesis. The potential partial obscurance of lithics by silt dunes, in part confirmed by the excavations into a low silt dune at AWS 48.I, poses some problems to our understanding of the distribution of the lithic scatter. However, while this may affect the reconstruction of intra-site spatial patterning and site size, it does not affect the coherence of the lithic assemblage recovered from each of the artefact scatters targeted. Overall, the identified clusters appear to be regular entities that fit well with what one can image to be short-term hunter-gatherer camp sites (Bartram et al. 1991; Kent 1991; Yellen 1977). Spatial analysis based on the densities of lithic artefact scatters at AWS 48 using a 5x5 m grid system, simple quantification, and nearest neighbour analysis in ArchGIS indicates the presence of six distinct clusters of artefacts in the area. While cover by aeolian silts appears to partially mask the full extent of the scatters, and while some scatters appear disrupted by post-depositional processes, the identified clusters can be clearly distinguished as distinct concentrations. Their general size and shape suggests that they conform reasonably well to the size of ethnographically-known hunter-gatherer camps. Although a direct analogy with ethnographically-known sites shall not be attempted here, this data nevertheless serves to identify clusters that, for the most part, are relatively undisturbed and provide insights into past activities here. The question can now be raised as to the degree of intra-cluster preservation of patterns or site structure.

At AWS48.III, all visible artefacts larger than 2 cm were mapped into the 180 m^2 area[7]. The limits of the survey area were arbitrarily defined and restrained by the length of the field season. In total, 4430 pieces were mapped using a total station (average number of pieces per 1 m^2 24.61). These were recorded using codes to subdivide them into three basic artefact categories: cores, debitage[9] and retouched artefacts. Figure 7.10 shows the distribution of all artefacts within the survey area, and Figures 7.11, 7.12 and 7.13 shows the distribution of debitage, cores and retouched pieces. Figures 7.14, 7.15,

7: Debitage was in this instance defined as including all types of debitage, including blades, flakes and bladelets.

7.16 and 7.17 present the densities of all debitage, cores and tools in the same area. Figures 7.10 and 7.11 indicate a slight drop in artefact frequency in the centre of the survey area, with two dense concentrations discernable in the western and eastern sectors. The western sector can be clearly distinguished as the denser of the two concentrations. Since the vast majority of recorded artefacts were flakes (see Table 7.1) there is little discernable difference between the density plots for all artefacts (Figure 7.10) and flakes (Figure 7.11). Distribution and density plots for both cores and retouched pieces resemble those of the flake distribution. Two clusters are discernable in the western and eastern sectors of the survey area. However, there is a notably higher density of flakes between E503 and E506 that is not accompanied by an equally high concentration of retouched artefacts or cores. One could tentatively interpret the concentration of retouched artefacts as distinct activity areas where disused or broken tools were discarded after use. However, the nature of the archaeological deposits (see above) and of the lithic assemblage (see below) seems to suggest that such detailed interpretations are not necessarily warranted. Given these data it appears that the spatial distribution of lithics at AWS48.III is sufficiently random to suggest that it is related to past human activities, rather than to disturbance effects from natural processes. No size ordering can be recognized that would indicate sorting as a result of fluvial or erosional processes. There is no ordering of any material recognizable, which would indicate significant disruption of the patterns where material may have been washed away. At the same time, this data does not unambiguously indicate significant patterns that could relate directly to human activities. While two broad clusters consisting of concentrations of flakes, tools and cores can be distinguished in the eastern and western sector of the survey area, it is doubtful whether these can be resolved in terms of spatial distribution to any higher scale. There appears to be too much potential for significant lateral movement and trampling for this to be possible.

Using counts of lithics recovered from each sub-area (50 x 50 cm) in the excavation area distributions of different artefact classes can be shown by cell frequencies (Figures 7.18-7.26)[8]. Unfortunately, comparing this data shows little to no apparent variation in the distribution of artefacts across the three sets of excavation areas at AWS48.III. This reflects, to some extent, the fact that dense surface concentrations of artefacts were targeted for excavation. Each sub-area seems to contain comparable frequencies of the different artefact groups. Micro-debitage (flakelets and chips) are somewhat more numerous in the eastern and western excavated areas, whereas they appear rarer in the centre. However, they are not under-represented there either. Cores and core trimming elements are well-represented in each sub-unit excavated, and the same ap-

8: Data from 5 sub-square datasets were lost following the excavation and appear blank in the figures.

plies to major debitage items (blades, flakes and bladelets). Only primary pieces are particularly abundant in the westernmost excavated area. The only other clear distinction that can be drawn is the higher occurrence of retouched items in the westernmost excavated area, which reinforces the idea that this may represent the residue of a particular activity. The excavated units are, however, clearly problematic for analysis of frequencies in each cell because they are not continuous and therefore cannot show data across a wider area. What they do suggest, with reference to the internal coherency of the assemblage, is that micro-debitage, other debitage, and cores were well-represented across the area, suggesting that little to no disturbance from fluvial deposits has affected artefact distribution. Indeed, no patterns or size sorting can be recognized from the frequencies of artefacts within cells.

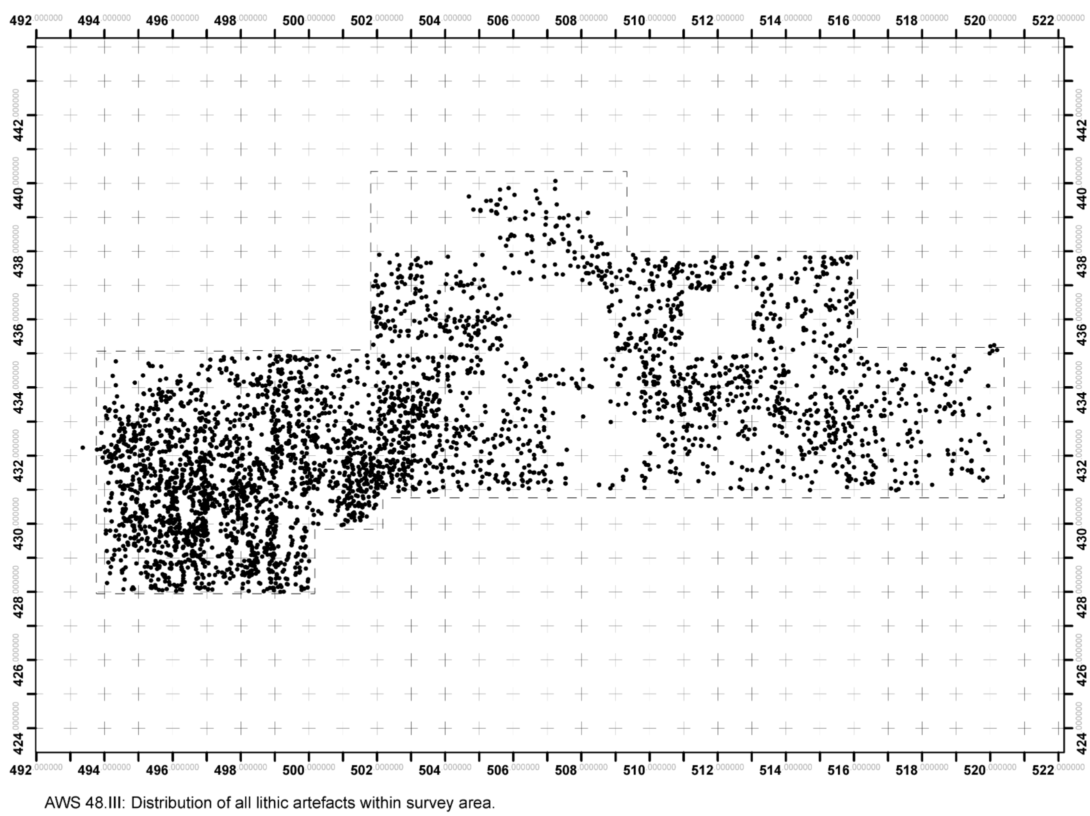


Figure 7.10: AWS48.III, distribution of all lithic artefacts (>2cm) in the survey area

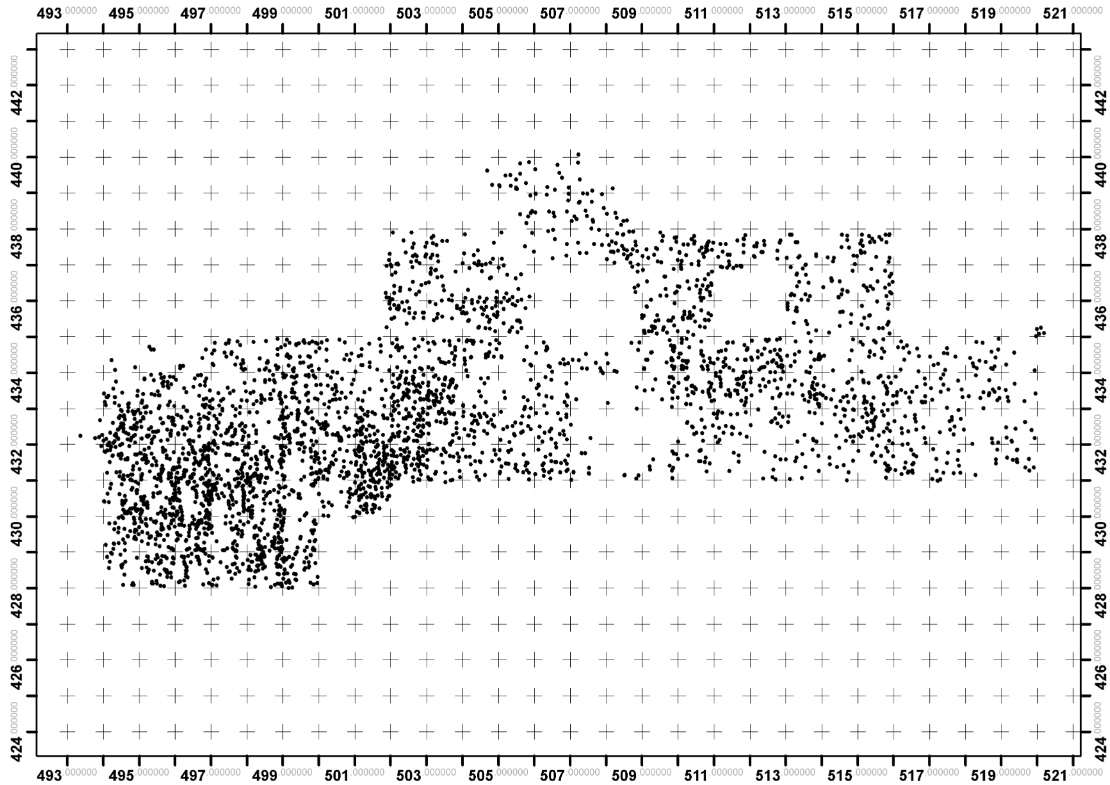


Figure 7.11: AWS48.III, distribution of flakes in survey area

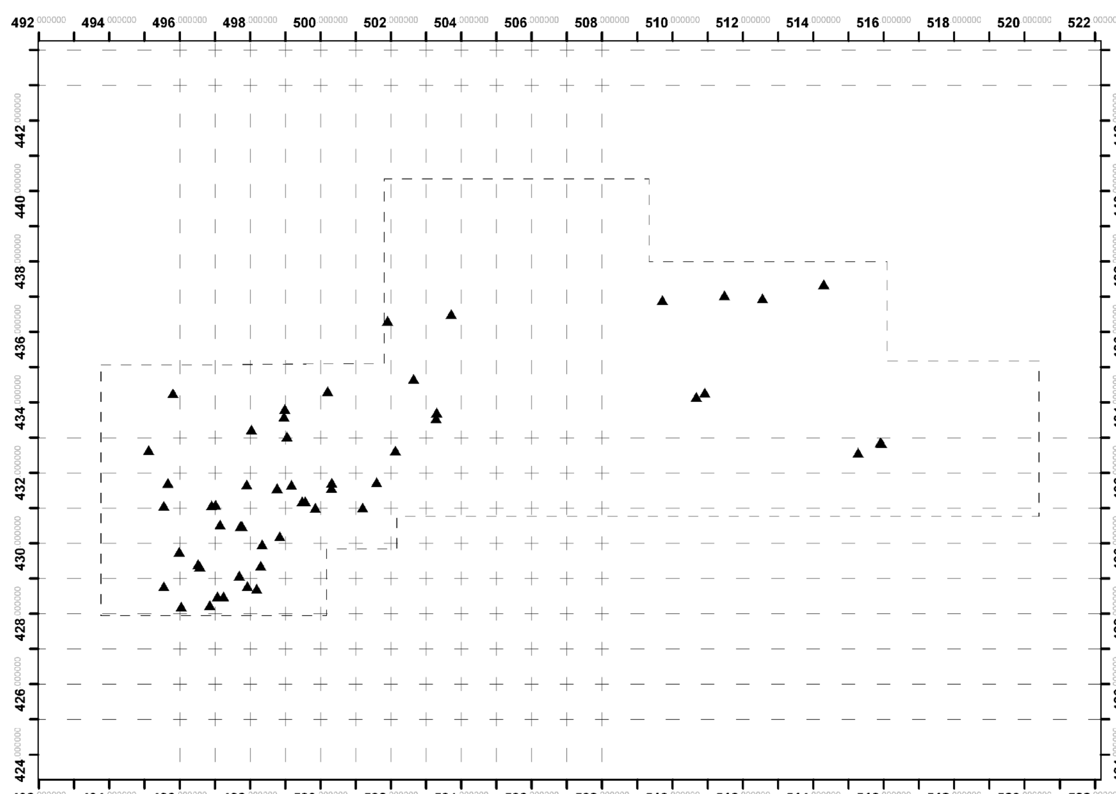


Figure 7.12: AWS48.III, distribution of cores in survey area

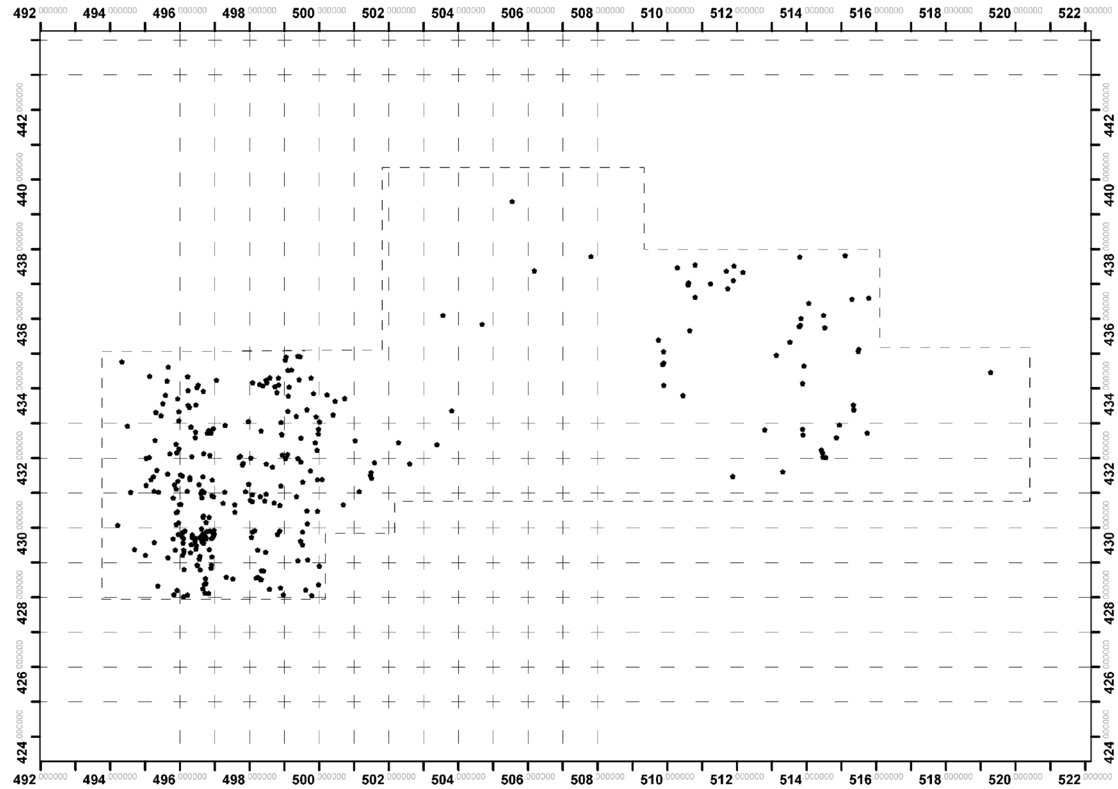


Figure 7.13: AWS 48.III, distribution of retouched artefacts in survey area

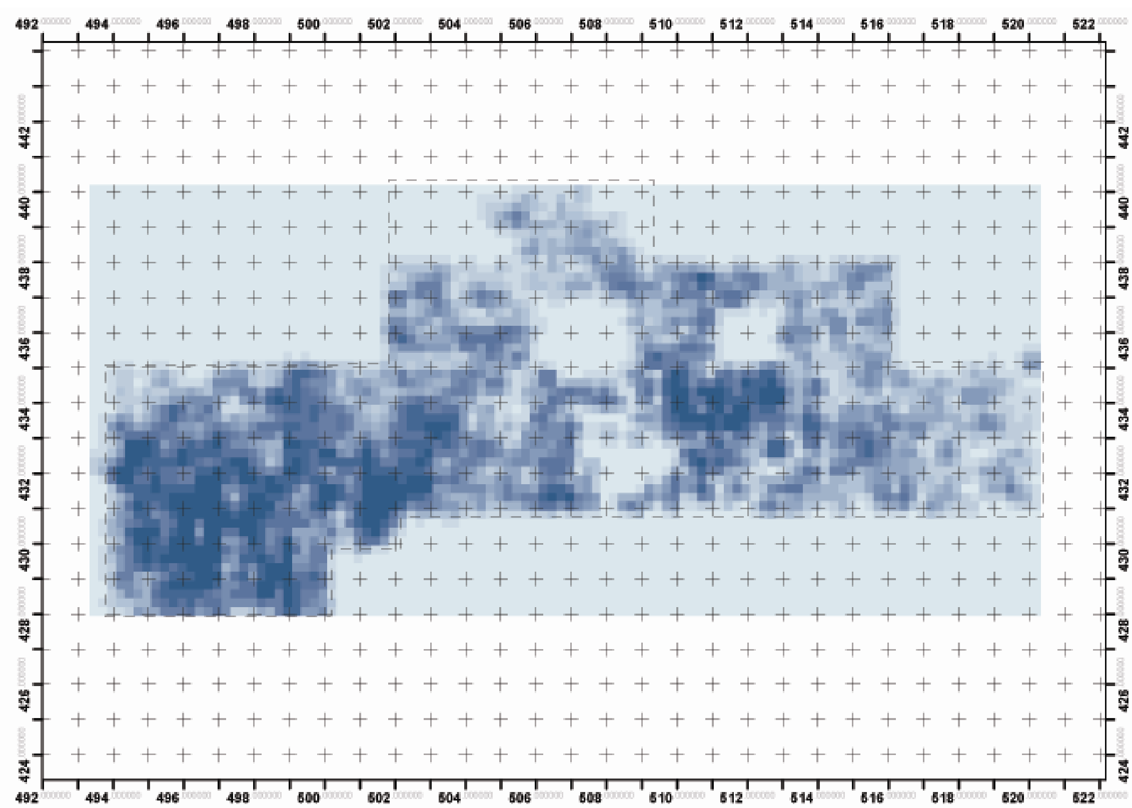


Figure 7.14: AWS48.III, density plot of all lithic artefacts in survey area

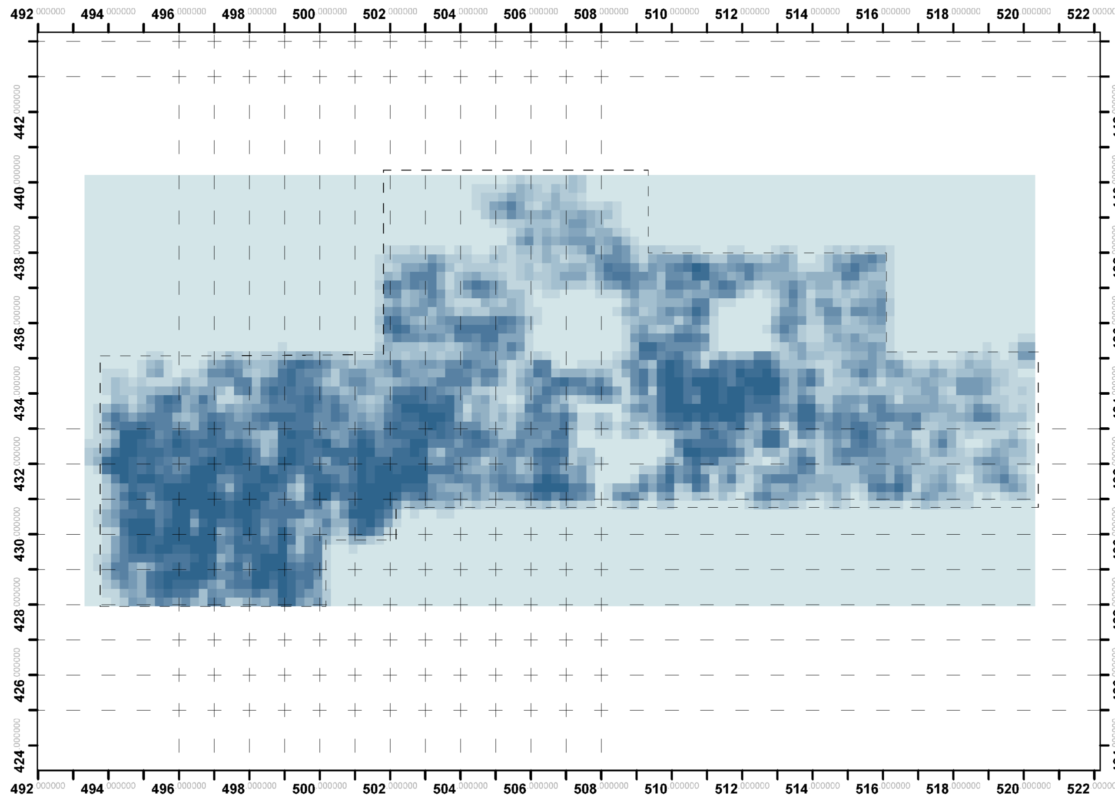


Figure 7.15: AWS48.III, density of flakes in survey area

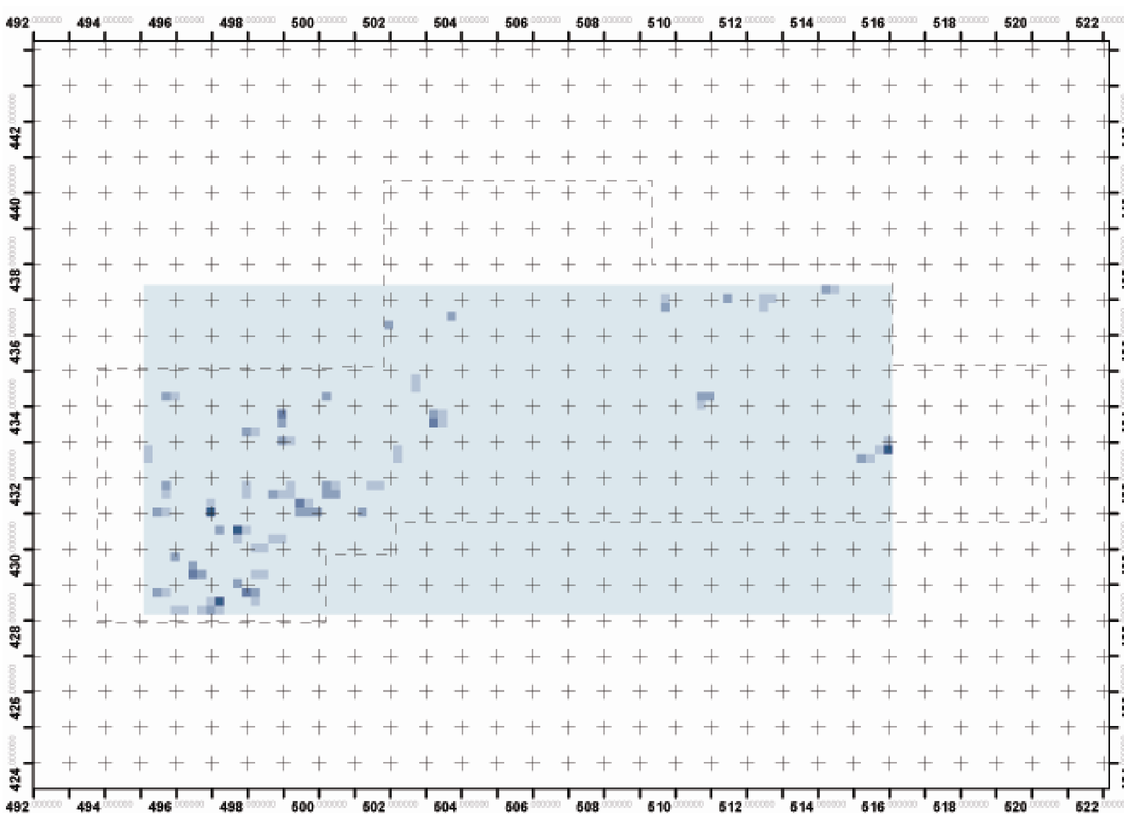


Figure 7.16: AWS48.III, density of cores in survey area

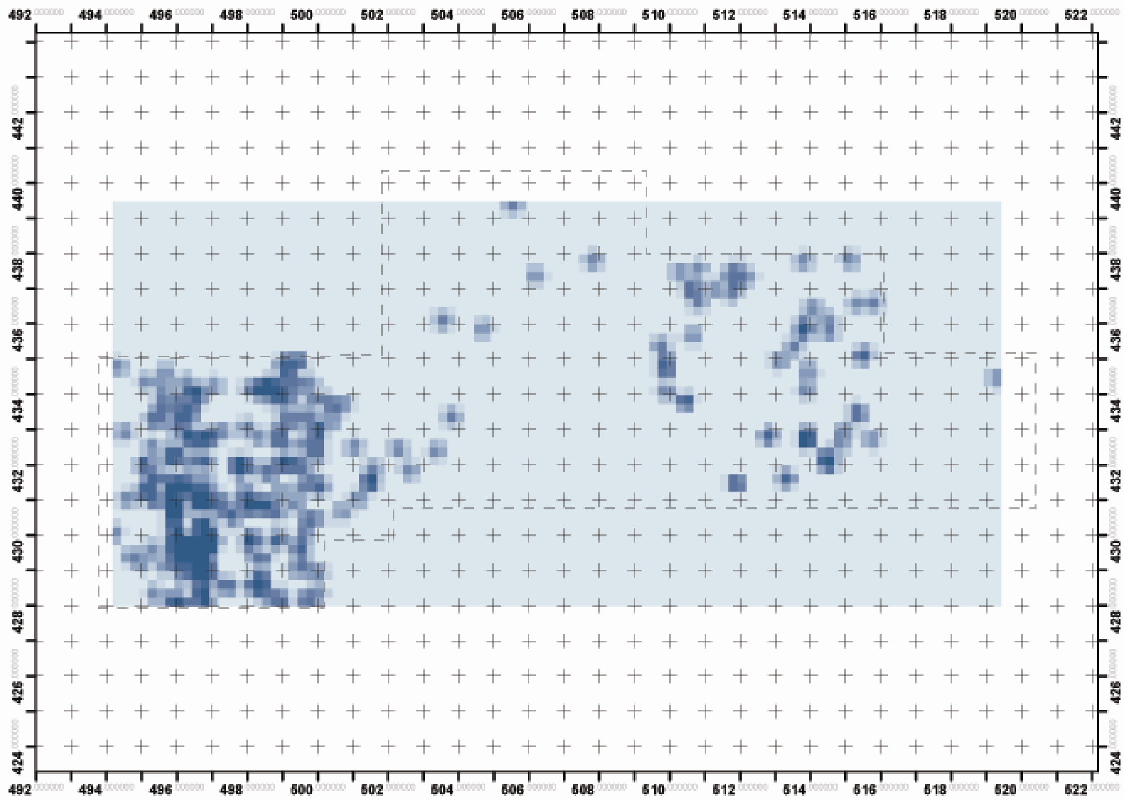


Figure 7.17: AWS48.III, density of retouched artefacts in survey area

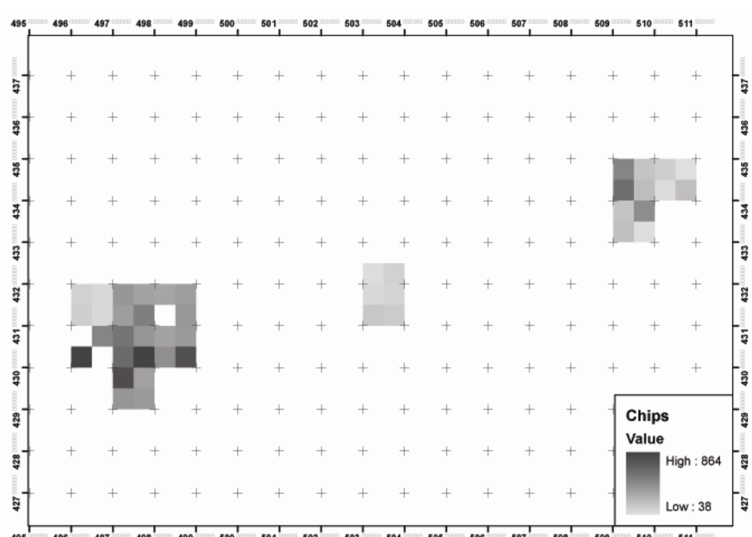


Figure 7.18: Distribution of chips in excavation areas at AWS48.III

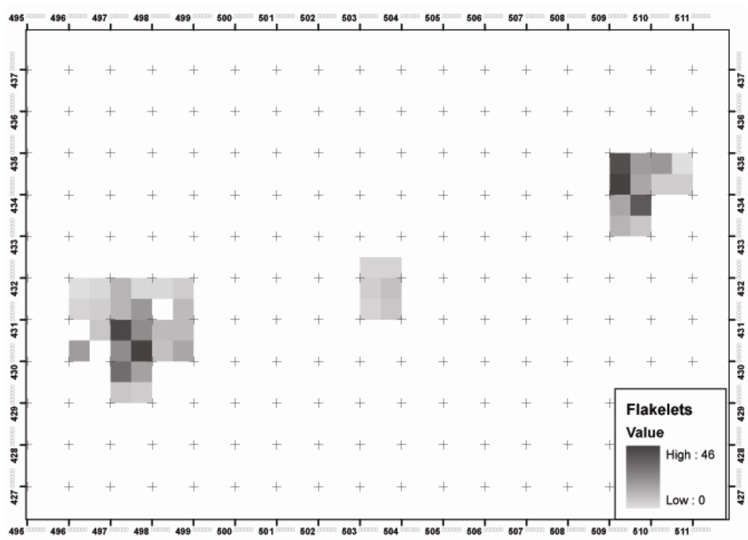


Figure 7.19: Distribution of flakelets in excavation areas at AWS48.III

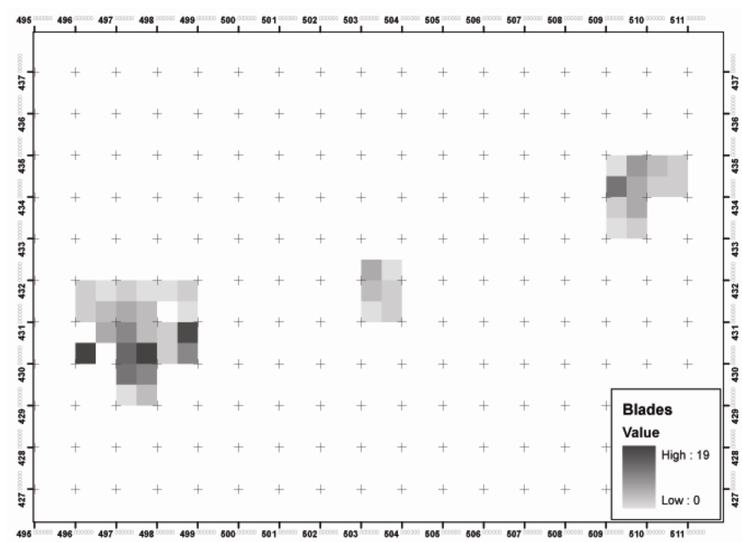


Figure 7.20: Distribution of blades in excavation areas at AWS48.III

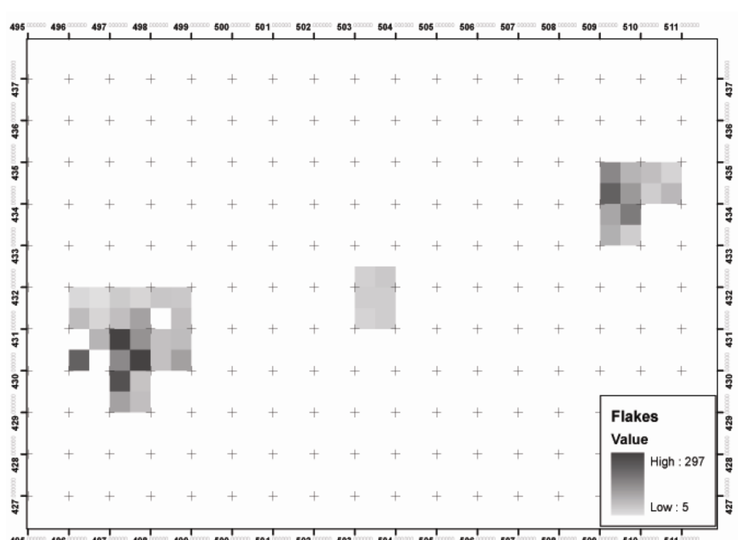


Figure 7.21 Distribution of flakes in excavation areas at AWS48.III

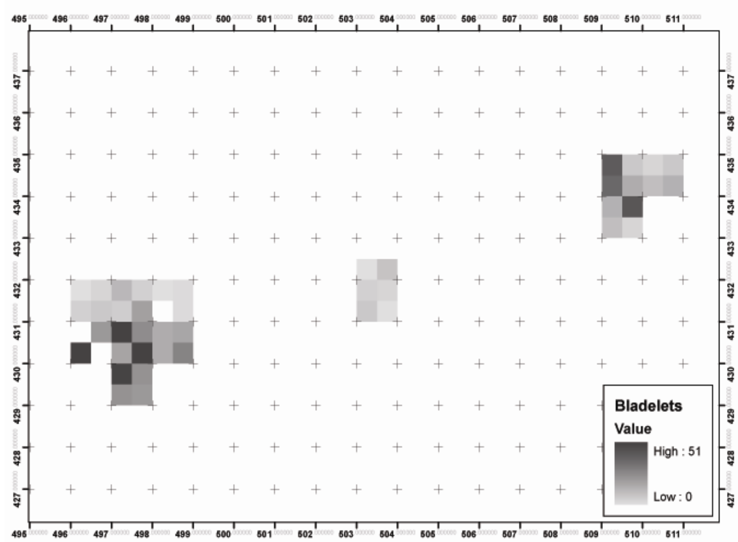


Figure 7.22: Distribution of bladelets in excavation areas at AWS48.III

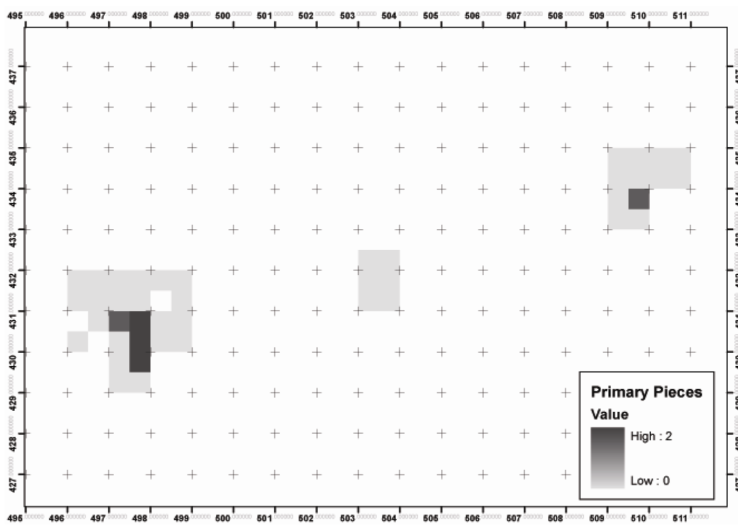


Figure 7.23: Distribution of primary pieces in excavation areas at AWS48.III

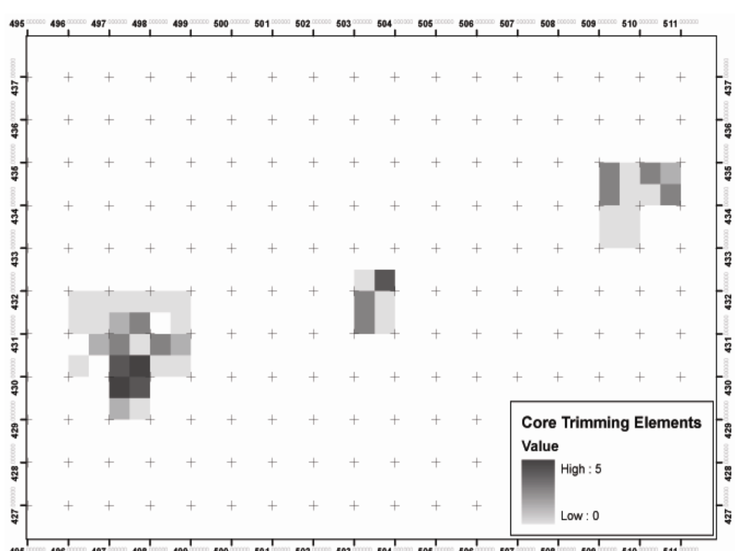


Figure 7.24: Distribution of core trimming elements in excavation areas at AWS48.III

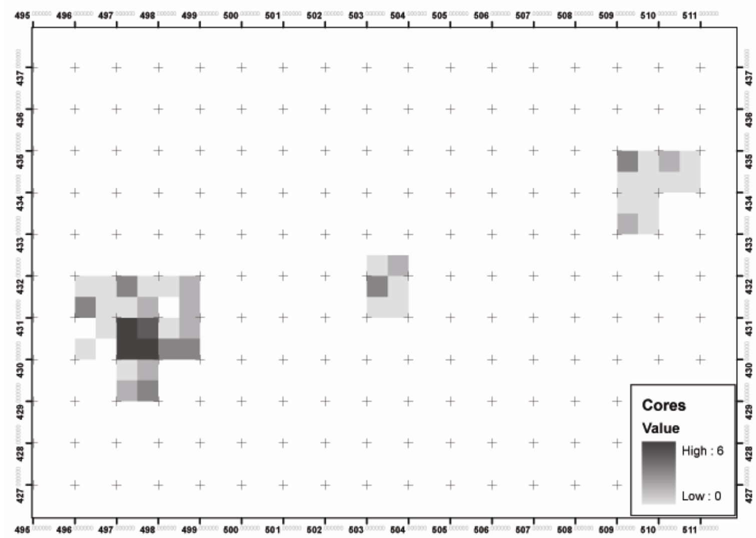


Figure 7.25: Distribution of cores in excavation areas at AWS48.III

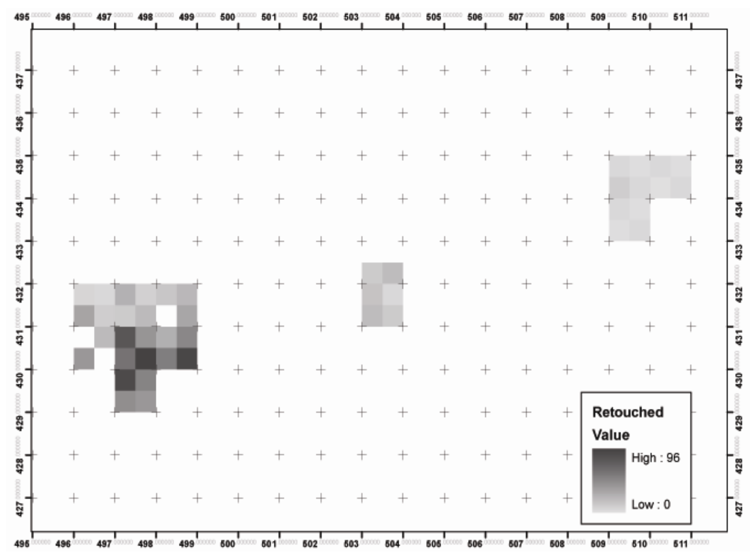
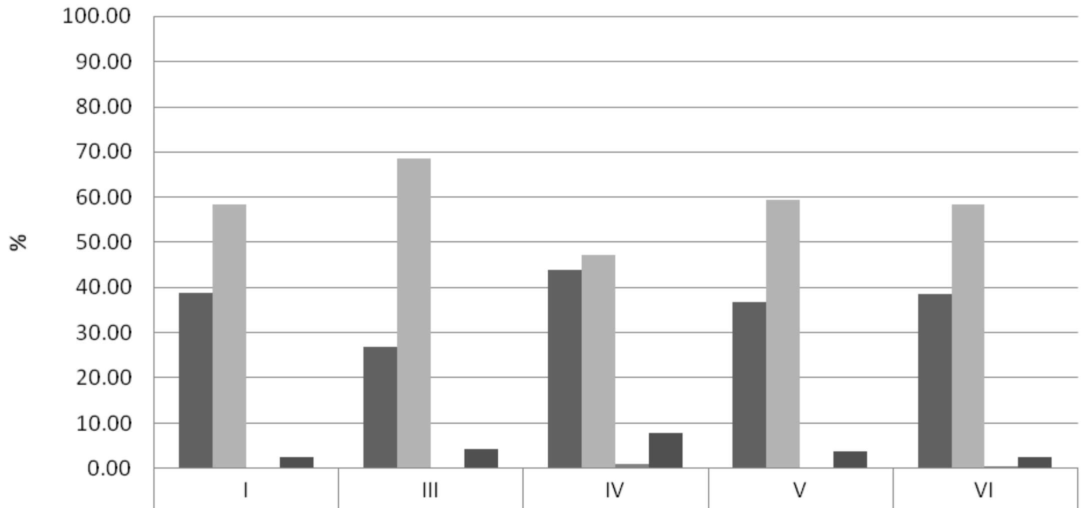


Figure 7.26: Distribution of retouched pieces in excavation areas at AWS48.III

TECHNOLOGICAL DATA

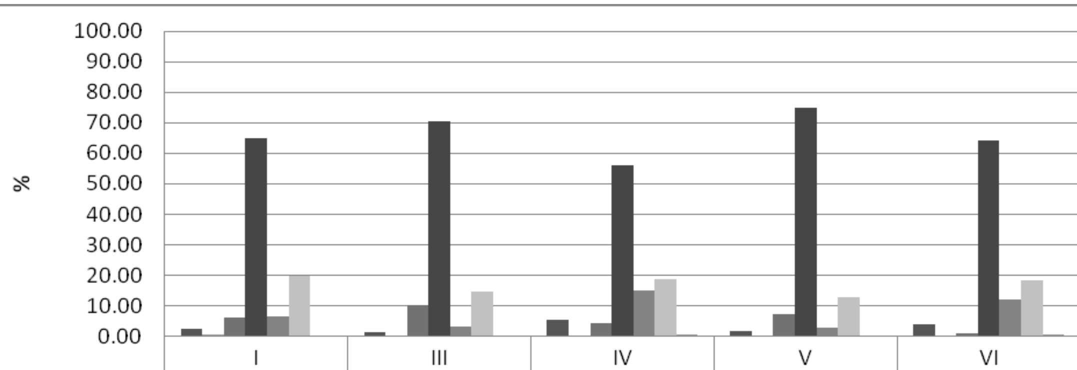
Figure 7.27 shows the proportional elements of the lithic assemblages from the five investigated clusters. Note that cluster 1 has a high number of recovered artefacts, because a large area was collected here. Cluster 3 includes material from both surface survey and excavation. Despite the differences in the size of the assemblages, chips are equally represented in each of the clusters. Given that chips represent the smallest element of the assemblages (<10 mm in diameter), it appears that either a removal of these tiny elements occurred at an equal rate in all clusters, or, that no post-depositional removal of artefacts occurred at all. Surface collections and excavations at clusters 4, 5 and 6 were limited to a few square meters each and this may have an effect on the representativeness of the sample. When the tool:core, debitage:core and debitage:tool ratios are considered, it is clear that a certain degree of variability exists (Table 7.1, 7.2). Clusters 1 and 2 are very comparable in the representation of tools versus cores, yet differ significantly with respect to the core:debitage and debitage:tool ratios. There is clearly more extant debitage at cluster 1, than at cluster 2, but there is no reason to suggest that this is related to site-formation processes. Cluster 5 appears somewhat skewed towards debitage and tools, since very few cores were collected, resulting in very high tool:core and debitage:core ratios, whereas the debitage:tool ratio is much more comparable to the other clusters. Cluster 6 is quite similar to cluster 1, displaying a high number of debitage versus a low number of tools. In general, it has to be borne in mind that the small areas in which collections were undertaken at clusters 4-6 were randomly placed within dense scatters of lithics, whereas the surface collection at cluster 1 and the excavations in cluster 3 covered a larger area and can therefore be expected to result in a more representative sample. The lateral distribution of different artefact types, especially cores, appears random. This becomes clear from the spatial data obtained from the detailed survey and excavations at cluster 3. It would therefore seem reasonable to assume that the samples collected from clusters 4-6 are not fully representative, but are skewed due to the limited area of surface collection and excavation. Nevertheless, these data indicate that while there may be some issues in how to assess the technological characteristics of the smaller assemblages from clusters 4-6, it appears that the clusters are comparable with regards to the presence of micro-debitage and suggests little or no post-depositional modification of the assemblage.

Splitting the assemblage according to debitage categories reveals a fairly homogeneous picture (Figure 7.28). Flakes outnumber blades/bladelets in all of the clusters, emphasising a trend previously observed in the Ayn Qasiyya assemblage. As noted earlier, this may relate to how blades/bladelets were defined as a category (see Appendix 2).



	I	III	IV	V	VI
Debitage	38.90	26.92	43.89	36.87	38.56
Chips	58.45	68.43	47.26	59.35	58.29
Cores	0.19	0.31	0.98	0.09	0.57
Retouched	2.46	4.34	7.86	3.69	2.58

Figure 7.27: Percentile composition of the lithic assemblages from five clusters at AWS 48 (Cluster I, n=29,377; Cluster III, n=15030; Cluster IV, n=2137; Cluster V, n=4521; Cluster VI, n=2438)



	I	III	IV	V	VI
CTE	2.29	1.13	5.54	1.80	3.83
Primary	0.45	0.22	0.00	0.30	0.11
Flakelets	6.09	10.30	4.16	7.26	1.06
Flakes	64.88	70.33	56.08	74.93	64.26
Blades	6.34	3.13	14.93	2.94	11.91
Bladelets	19.82	14.61	18.76	12.72	18.30
Burin Spalls	0.13	0.27	0.53	0.06	0.53

Figure 7.28: Percentile representation of debitage classes in the AWS48 assemblages (Cluster I, n=11428; Cluster III, n=4058; Cluster IV, n=938; Cluster V, n=1667; Cluster VI, n=940)

Primary flakes are rare in all of the assemblages. This indicates a high likeliness that initial core reduction did not take place at AWS 48. Core trimming elements are numerically well represented in clusters 3 and 5, although this may reflect the potentially biased nature of the sample. Core trimming elements are a somewhat more significant component of the cluster 1 assemblage, where they represent just over 2% of the assemblage. Here, bladelets are also well represented. Only flakelets appear underrepresented in cluster 5, where they constitute just over 1%. This is not mirrored by an equally low number of chips, which would suggest that this tendency probably reflects a sample bias. A comparable relationship can however also be observed in cluster 1 and 5. Overall, then the categorization of debitage types and the overall composition of the assemblage follows along a similar trend. Few cores and primary pieces appear to suggest a lack of initial core reduction at the site. Small and micro-debitage items are well represented in the sample, which suggests little impact of surface water displacement of minute particles.

Table 7.3 charts the density of lithic artefacts per cubic meter from the five clusters at AWS 48. Within the context of the fieldwork at the site, this data has to be understood as an approximation, since no real excavations took place except at cluster 3. The calculation of excavated cubic meter is somewhat skewed, because no significant depth of artefact-bearing deposits were encountered. Nevertheless, this data provides some indication as to the overall proportional density of the material at the sites. Clusters 1 and 3 produced a very comparable density per cubic meter, which corresponds with the fact that these are the two clusters at which the largest area was collected and excavated. In comparison, the densities in clusters 4 and 5 appear exceptionally high. This may relate to the fact that in both instances fairly small areas were collected and excavated and these small areas targeted the densest visible concentration of surface finds. It can be expected that if collections and excavations at both localities were expanded the overall density per cubic meter would probably level out toward the norm of clusters 1 and 3. This tendency is apparent in cluster 6, where only a marginally larger volume results in a lower density of material. As far as clusters 1 and 3 are concerned, this data indicates that the clusters are of coherently high density, suggesting that they retain a degree of integrity. Quantitative data on the condition of the assemblages has only been obtained as part of the more detailed analysis of the cluster 3 lithic assemblage. Field observations and visual inspection of the recovered material from all clusters indicates, however, that there is a high degree of post-depositional re-patination of the flint, as well as significant surface alteration induced by aeolian activity (pitting from sand blasting). In all of the assemblages, the patina is generally white in colour, rather than typical desert patina found elsewhere. Data obtained from the analysis of the cluster 3 assemblage shows that 80.5% of the debitage and tools display signs of re-patination, while 7.8% of the assem-

	Tool : core	Debitage : core	Debitage : tool
I	13.16	203.02	15.42
III	14.24	87.22	6.13
IV	8.00	44.67	5.58
V	41.75	416.75	9.98
VI	4.50	67.14	14.92

Table 7.1: AWS48 lithic assemblage ratios according to clusters

	CTE : Core	Flake : blade/ bladelet
I	4.76	2.48
III	1.00	3.96
IV	2.48	1.66
V	7.50	4.79
VI	2.57	2.13

Table 7.2: AWS 48 lithic assemblage debitage ratios

	Total # of lithic artefacts	Area (in m^2)	Average Depth	~m^3	Volume/m3
I	29,115	47	0.1	4.7	6,195
III	15,030	12	0.2	2.4	6,263
IV	3,095	2	0.1	0.2	15,475
V	7,204	5	0.1	0.5	14,408
VI	3,859	4	0.1	0.4	9,648

Table 7.3: Estimated artifact densities.

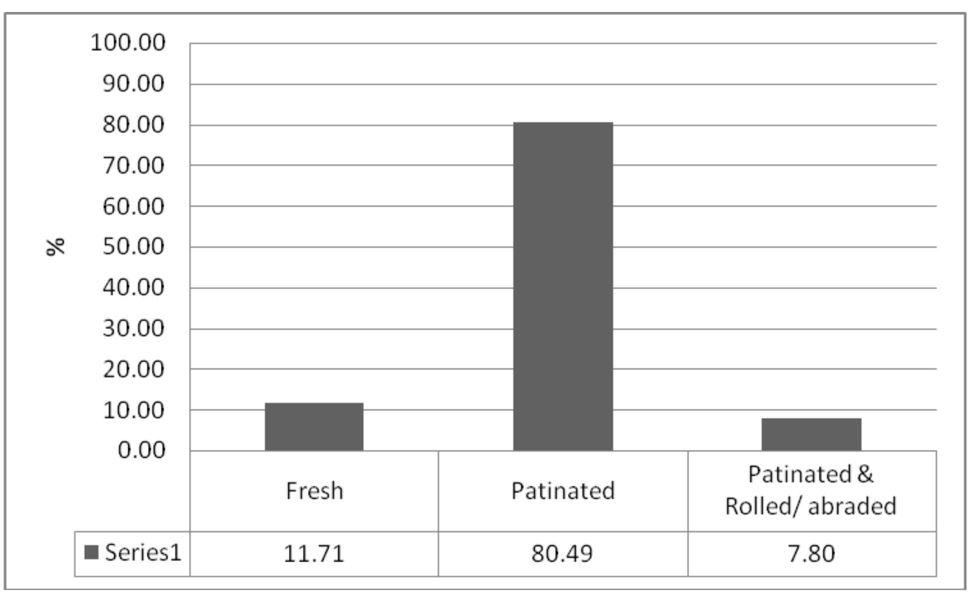


Figure 7.29: Condition of debitage and tool sample from AWS48.III (n=897)

Figure 7.30: Excavations into silt dunes at AWS48.I. Exposed are a series of discrete concentrations of cores with associated debitage scatters, possibly indicating an in situ knapping event.

Figure 7.31: Close up of one concentration of two cores and associated debitage.

blage is both patinated and rolled/abraded (7.29). The latter encompass pieces that show pits and abrasion commonly associated with sand blasting. 11.7% of the assemblage is considered fresh; having sharp edges and no evidence of rolling, abrasion or staining. In some cases, material within the re-patinated group was not fully patinated so that the underlying raw material properties could still be assessed and described. While there are many factors influencing the formation of flint patina, it is generally recognized as a useful indicator for the preservation conditions at a site (Hurst & Kelly 1961; Luedtke 1992; Schick 1980, 1986; Schmalz 1960a; Schmalz 1960b). Here, the high level of patination indicates exposure of the site for a considerable amount of time. The small pits indicating damage by aeolian activity support this suggestion. It is worth pointing out that the amount of fresh pieces appears to be correlated in some instances with the presence of dunes. In the case of cluster 1, excavations within one of the dunes adjacent to the flint scatter recovered an entirely un-patinated assemblage representing one knapping event (Figure 7.30 & 7.31). This would suggest that dunes may have covered the area at some point, and that alteration of the exposed flints is entirely post-depositional. The heavy patination and rolled/abraded nature of some of the artefacts did, in some cases, pose difficulties for the analysis of the lithic assemblage from cluster 3. Overall, this data indicates that there has been a significant degree of post-depositional alteration, although this does not suggest that the distribution of the collected material has been severely affected.

Charting the size of the analysed material from cluster 3 in cumulative percentages, results in Figure 7.32. This graph indicates that the majority of the tools and debitage are between 1 and 5 cm in maximum length. The curve strongly resembles both those from Ayn Qasiyya (see chapter 6) and the experimental data obtained by Schick (1986). Together with data from sorted debitage from all clusters, the data supports the idea that little natural post-depositional modification of the assemblages occurred. Fluvial activity would have led to the removal of small and micro-debitage from the assemblage, since they are easily transported by water. Given the available data this does not appear to have occurred. Chips, flakelets and bladelets and smaller flakes are represented in the assemblage, as are larger pieces. This suggests that the overall assemblage has not been displaced to such an extent that categories of lithic artefacts are underrepresented or missing. In terms of the geomorphological context of the site and how it relates to site-formation processes, AWS 48 represents a very different case to that of Ayn Qasiyya. AWS 48 is situated amongst silt dunes in the southeastern sector of the wetlands reserve and its fine, loose topsoil is easily subjected to aeolian disturbance. Trampling by humans and animals may have also played some role in moving or replacing artefacts. There is no discernable evidence for significant fluvial activity in the area. Despite the presence of dunes, the overall topography of the area is flat, with fluvial activity being confined to incised channels in the vicinity of the site. These are likely to have changed course over the millennia, but there is no available evidence to suggest that they cut through the site. There is no evidence to suggest that there was an active spring in the southeastern sector of the Azraq marshlands. Given these conditions and the nature of the soil matrix at the site, very fine and loose silt, fluvial activity can be ruled out as having formed or altered the site's artefact composition. Aeolian activity and trampling are both indicated by the condition of the assemblage (see above) and the occurrence of material seemingly pushed into the subsoil. While these are likely to have contributed to the localized displacement of artefacts, significant removal of materials is unlikely and the assemblages can thus be used to assess past technological practices. Third, it reflects a long-term, repetitive pattern of people re-visiting the same spot in the landscape. Before moving on to a more detailed discussion of the *chaîne opératoire* of the lithic artefacts from both sites, these issues shall be briefly discussed here before returning to them in chapter 10.

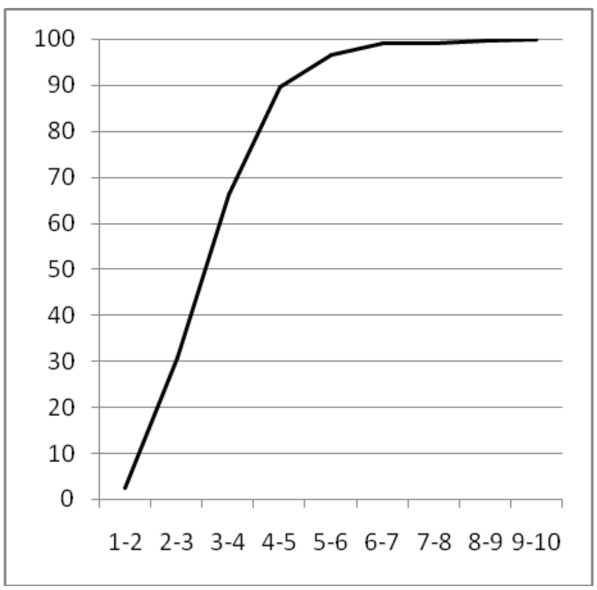


Figure 7.32: Cumulative percentage graph of debitage size in cm from AWS48.III (n=231).

SUMMARY

AWS 48 is the only Middle Epipalaeolithic (Geometric Kebaran) site found in the Azraq Oasis to-date. It consists of several clusters of surface lithic scatters, providing useful insights into past use of this part of the oasis. Three observations are particularly crucial with regards to the site. First, the above discussion has shown that the site's artefact inventory can be used to discuss past technological practices. Second, the site is of a decisively different character to that of Ayn Qasiyya or indeed other sites in the region.

Based on the taphonomy, composition and spatial distribution of the AWS 48 assemblages, I argue that they can be used to discuss technological practice. While the condition of individual pieces within the assemblage has been modified by post-depositional processes relating to the formation of patina and damages induced by sand blasting, the overall composition of the assemblage appears to have remained relatively intact. This poses problems in particular for the identification of raw material types and questions that can be addressed through a study of raw material representation. Small scale lateral displacement is likely to have occurred at a site which was easily affected by trampling and movement by wind due to a very fine and loose depositional matrix. While lateral and vertical displacement is likely to have occurred, it does not appear to have significantly altered the composition of the assemblage. In terms of spatial distribution the assemblage retains a general degree of integrity and is sufficiently randomly distributed to assert that its spatial configuration relates in general terms to human practices in the past. Although it is not possible to confidently reconstruct specific areas of activity on this basis the retrieval of the artefact assemblage from cluster 3 targeted a useful area to obtain sample material. A study of assemblage composition and analysis of the size of different elements in the assemblage revealed that the configuration resembles those recreated in experiments. The abundance of micro-debitage in the assemblage, in particular, suggests that little fluvial disturbance occurred as part of any post-depositional process. Overall, this data indicates that the technological characteristics of the assemblage can be assessed with a reasonably high degree of confidence to address questions about human practice. The identified clusters are randomly distributed across the survey area and the non-anthropogenic process to which their distribution can be related is the deposition and erosion of silt dunes. Silt dunes appear to mask some parts of scatters, while concentrations of lithic artefacts are exposed where silt dunes have been removed. The distribution documented is therefore biased and prohibits more detailed discussion of the spatial configuration of the clusters. Internally, each cluster has also been subjected to natural processes resulting in limited disturbance. This disturbance is such that the original depositional context can be considered sufficiently disturbed to prevent a detailed spatial reconstruction of past activities. At the same time, natural processes have not removed elements of the chipped stone artefact assemblages so that the technological and typological characteristics of each collected sample of lithic artefacts can be discussed on a general scale.

AWS 48 is clearly very different to Ayn Qasiyya. Not only is it not a buried site, but it is also a much shallower and dispersed site situated in a different part of the southern Azraq landscape. The depth of deposition is taken to be inversely related to the length of occupation at each of the clusters, which show lateral shifts across this particular space. Especially the lack of depositional depth, reinforced by the lack of any sub surface archaeological features, suggests that these reflect short term occupations. The general size of the identified clusters suggests that they may represent discrete visits by groups (or a group) who used this area on short-term trips

Chapter 8: Ayn Qasiyya Knapped Stone: *Chaîne Opératoire*

INTRODUCTION

This chapter summarizes the lithic industries from the early Epipalaeolithic deposits at Ayn Qasiyya. Their analysis and consideration will draw directly on the concept of *châine opératoire* as outlined in chapter 4. The aim is to provide both a detailed description of the way in which chipped stone was manufactured at the site, as well as a means to discuss the operation of technical agency by human actors in the landscape. Through analyzing and describing the manufacturing processes of lithic artefacts at the site, by considering the similarities and differences between the different excavation areas, and discussing the functioning of this technology within the broader landscape, a fragment of the past *taskscape* of the Azraq Oasis is revealed. The thick description provided in this chapter, as well as the next one, is engrained with an understanding of technical agency and knowledgeable engagement with the world, reinforcing and at once creating social structures through practice (Dobres 2000; Ingold 2000; Pfaffenberger 1992). This provides further opportunities to then discuss how spaces in the landscape were socially constructed in the Azraq Oasis and beyond through the enactment of cultural memory relating to the carrying out of activities in particular places at particular points in time. Furthermore, it provides an opportunity to discuss the interactions and enchainments of people and materials across the Azraq Basin and beyond, by considering the detailed technical gestures and procedures operating in the creation of the Ayn Qasiyya assemblages. In chapter 10, I argue that these technical gestures and procedures are intimately connected to processes of social and situated learning, which provides an opportunity to discuss the social interactions of communities sharing different histories of learning. The discussion of the lithic data presented here will compare the three main excavation areas at Ayn Qasiyya: Areas A, B and D. As part of the analysis of much of the data it became apparent that sample sizes might be too low to be statistically viable when separated according to archaeological context in each excavation area. The material from each context was thus amalgamated within each excavation area to increase sample representativeness. Analysis of the material on the basis of a sub division into contexts revealed no significant intra excavation area differences, while at times sample numbers were too low to be statistically representative. It was therefore decided to collapse the material from each context into three major samples from each excavation area. Since the deposits these contexts represent can be considered part of the same formation process, and the dating evidence obtained from Area A at least is tightly clustered (see chapter 6), this amalgamation can be justified. From the initial examination of the assemblage there appears to be little intra excavation area sub phasing to the lithic assemblages, at least as far as typology or principal technology are concerned. Differences in the technological and typological characteristics between Areas A and B on the one hand, and Area D on the other, were recognized early on in the analysis. These clear differences, which have been observed at other sites across the southern Levant, permit the grouping of the assemblages according to excavation area. Initial observations also indicate that there is little variation between contexts within each excavation area. In addition, it appears that in the majority of cases, sample numbers would be too low to verify any such variation statistically beyond doubt. The focus is then on the juxtaposition of the lithic assemblages from Areas A and B, and that of Area D, with the former two corresponding to the so-called Kebaran industry and the latter with the Nebekian industry. This discussion has significance for the relationship between these two industries as the interpretation of their variability has been at the heart of a number of recent debates (Barton & Neeley 1996; Clark 1996; Fellner 1995b; Goring-Morris 1995; Goring-Morris 1996; Henry 1996; Kaufman 1995; Maher & Richter in print 2009; Olszewski 2001a, b, 2006; Phillips 1996; Richter in print (2009)). From the perspective of trying to understand how differently constituted social communities may have interacted within the Azraq landscape and constructed this landscape socially in different ways, this juxtaposition of the evidence also makes sense. The structure of this chapter is built around the concept of the *châine opératoire*. Beginning with raw material selection and initial core reduction, I proceed to blank production and tool manufacture, before attempting an outline of the full operational sequences. While this reproduces a common and inherent problem in the application of the *châine opératoire* concept, namely its linear and progressive structure, which must be fully recognized and acknowledged, this structure is nevertheless a useful heuristic vehicle to outline the social technology used by Ayn Qasiyya's artisans. The general composition of the lithic assemblage is tabulated in Tables 8.1 and 8.2 (see also Figures 6.35 and 6.36).

RAW MATERIAL USE

Flint knappers at Ayn Qasiyya drew on a variety of different types of flint for the manufacture of chipped stone artefacts (Table 8.3; Figures 8.1, 8.2 and 8.3). Of these, three types of flint dominated the assemblages: a light-brown to yellow flint with few

	Cores	Primary	Debitage	Chips	Retouched	Total
Area A	25	36	2,722	5,196	286	8,265
Area B	29	48	6,136	4,170	373	10,756
Area D	38	69	7,917	12,723	978	21,725
Total	92	153	16,775	22,089	1,637	40,746

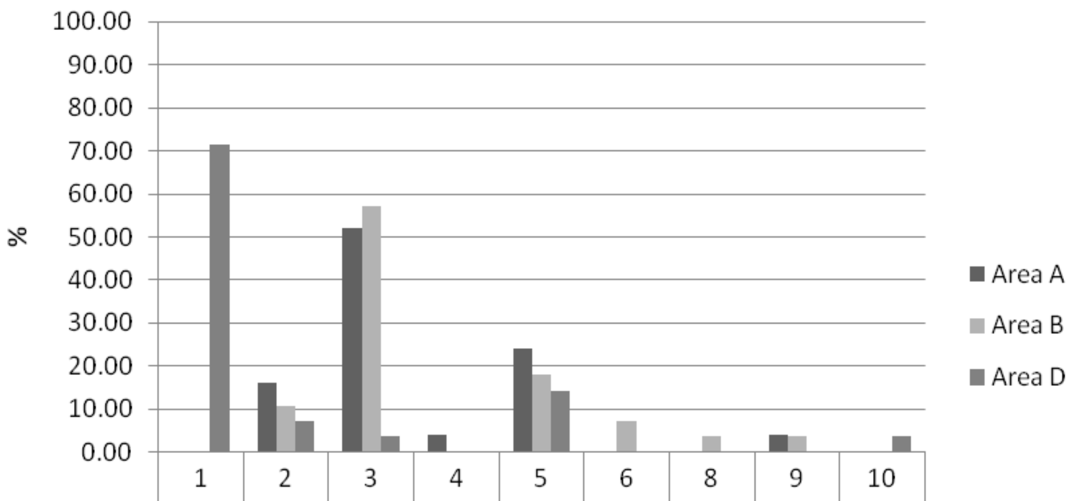
Table 8.1: Absolute composition of the Ayn Qasiyya lithic samples

	Primary	CTE	Flakes	Blades	Bladelets	Flakelets	Total
Area A	36	40	1,105	183	352	1,031	2,747
Area B	48	89	1,601	170	949	1,301	4,158
Area D	69	319	4,106	343	2,021	1,091	7,949
Total	153	448	6,812	696	3,322	3,423	14,854

Table 8.2: Absolute composition of the Ayn Qasiyya debitage samples

Raw material type code	**Description**
1	Light brownish-yellow, medium-coarse flint with creamy-white, smooth cortex (can tend toward more reddish to medium brown varieties). Flatish, angular nodules.
2	Light blueish-grey flint, medium-coarse with a grey-whiteish fairly smooth cortex. As well as cortical exterior is also often a repatinated surface (indicates redeposition and exposure)
3	Dark-grey to black flint of medium coarseness. Has sometimes fairly significant microfossil inclusions. Cortex is 'knobby' and rough, sometimes discoloured by oxidization/ iron staining. Similar material observed in situ in limestone outcrops close to the site (this material however too small and battered for use). Appears to consist of partially redeposited material. Rounded, small nodules.
4	Light grey to whitish, very coarse flint. Ambiguous cortex. Very nasty material
5	Mid to dark grey medium coarse flint. Has a banded colouration. Cortex is generally smooth and sometimes bluish tainted.
6	Dark grey coarse flint with few inclusions. Banded colouration.
7	Mid-grey flint with numerous small inclusions, but not banded.
8	Miscellaneous, other flint (catch-all category for material too ambiguous to be classed in the above, but not numerous enough to be described any further)
9	White-grey coarse flint with a smooth, fine cortex. Nodules are angular and flatish.
10	Light brownish red, very fine grained flint.
11	Mid grey, very fine grained flint.

Figure 8.3: Raw material types in the Ayn Qasiyya assemblage



	1	2	3	4	5	6	8	9	10
Area A	0.00	16.00	52.00	4.00	24.00	0.00	0.00	4.00	0.00
Area B	0.00	10.71	57.14	0.00	17.86	7.14	3.57	3.57	0.00
Area D	71.43	7.14	3.57	0.00	14.29	0.00	0.00	0.00	3.57

Figure 8.1: Frequency of core raw material types (Area A, n=25; Area B, n=29; Area D, n=38)

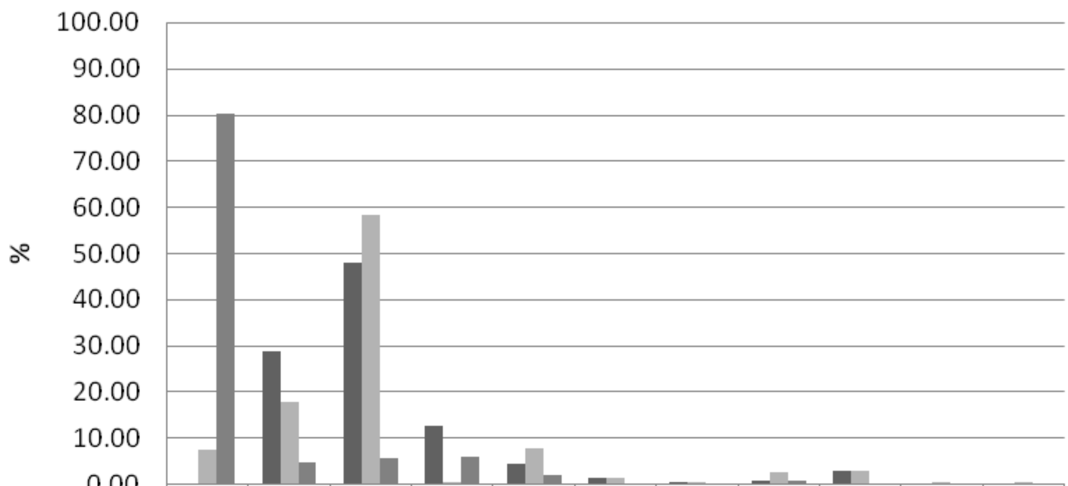
visible inclusions, a dark-grey to black flint with a white cortex and occasional inclusions, and a fine, light-blue/grey flint. These three types dominate amongst cores, debitage and retouched items. A banded, grey to brown flint was also occasionally used. Flint is ubiquitous in the Azraq landscape, especially in the limestone-dominated areas to the east and south of the oasis, where the flint erodes from tabular outcrops or as cobbles in nearby wadis. Table 8.4 summarizes the exterior surface characteristics of cores (where present) and correlates them with raw material type. The table indicates that the majority of cores display angular surfaces, indicative of deriving from angular nodules. However, since many cores have been heavily modified it is difficult to ascertain whether they were angular nodules or part of larger tabular blocks. Since the majority of sources in the basin consist of tabular flint it seems likely that the majority of the raw material probably derived from tabular flint. Fewer nodules show battered or rounded exteriors, which indicates that the majority of the material was probably collected from bedrock sources, rather than from wadi beds. When we examine raw material type by excavation area, there is a clear spatial pattern; Areas A and B display mainly raw material types 2 and 3, however, a greater variety of flint is also noted here. In Area D, between 64 and 80% of the raw material used, depending on artefact class, consisted of a light-brown to yellowish flint. Although there is a slight decline in the dominance of this raw material with increasing depth here, it always outnumbers other raw material types. This quantified difference can also be shown to be statistically significant. A Chi-squared test of the frequency of light-brown to yellowish flint to other types produced a results of $E=4.6012 \times 10^{9}$ (debitage), $E=6.30655 \times 10^{12}$ (cores), and $E=3.628 \times 10^{182}$ (tools). These results clearly show that the null hypothesis can be rejected in all three cases, suggesting that the observed pattern is not due to a sample bias. The difference between use of different raw material types amongst the two excavation areas was also immediately apparent during excavation, since the differences in colour were immediately obvious.

The source of raw materials found at Ayn Qasiyya is not immediately apparent, since a comprehensive raw material survey has not been conducted in the Azraq Basin. It can therefore not be ascertained from where precisely the raw materials were collected. Nevertheless, the clear difference in raw material use between Areas A/B and Area D suggests that flint was collected from different locales in the landscape. The underlying reasons for this cannot be identified with any precision. It may reflect diachronic differences as flint sources became exposed at different points in time and therefore were more differentially accessible. At the same time it may correlate to the way in which early Epipalaeolithic communities moved around in the Azraq landscape as part of a seasonal, or other, pattern. This would indicate an interesting dimension of use of the Azraq landscape. In this respect it is interesting to note that, on average, there is a higher degree of variability within Area A/B when compared to Area D. This indicates that flint knappers drew on a wider range of sources, which may in turn reflect either wider ranging movement or a more long range pattern. However, this assertion cannot be made without a note of caution. The number of cores recovered from Areas A/B is small and some of the common raw materials from these areas blend into each other where colour is concerned. Since the original sources cannot be described it is possible that some of the raw material variability is an artificial construct of having to rely on the description of the raw material by colour and inclusions alone. The colour of flints can change significantly throughout one flint nodules according to changes in chemical composition and purity. While the most fine-grained, high-quality flints are often uniform in colour, many flints in Transjordan display dramatic changes of colour from the outer part of the core towards the interior, or are identified on the basis of their mottling or banding. Thus, flint ascribed as belonging to two different raw material types based on colour properties, but may in fact have originated from the same, variable nodule. This issue can, however, not be evaluated at Ayn Qasiyya until a comprehensive raw material survey has been conducted across the Azraq Basin, which lies beyond the scope of the present work.

As a final note, we must also recognize that many stone-using groups known ethnographically attach very specific meanings to different raw material sources. Taçon (Taçon 1991) has described how mythological understandings of the landscape relating to the Dreamtime and kinship patterns have a direct bearing on the use of different raw material sources for stone tool manufacture in western Arnhem Land in Australia. Similar observations on how lithic assemblages are bound into cosmological understandings amongst Australian Aborigines were made by Gould (1980). Likewise, Hampton (1999) has discussed how kinship and ancestor relations influence the use of stone quarries amongst the Dani people of upland Papua New Guinea. These examples indicate that social understandings of the landscape may have played an important role in the exploitation of raw material sources. It seems likely that all of these factors played some role in the differential selection and use of raw materials at Ayn Qasiyya. The selection of raw material and their transport to the site forms the initial step in the Ayn Qasiyya operational sequence and the discussion above suggests a clear difference between the material from Areas A/B and D. Pursuing this argument, we can understand the selection of these raw materials as part of people's knowledgeable engagement with the landscape. Flint-knappers likely assessed the quality and suitability of the selected raw material sources and were familiar with the places where they could be obtained. Such places were imbued with meaning and may have been associated with rights of usage and mythological associations. It is likely that this interplay of extraction and social association was a complex pattern, where one reinforced the other, as people engaged with raw materials, the landscape, and simultaneously attended to each other communicating practical knowledge, ideas, concepts, planning ahead and ordering the cosmological and mythological relationships of time and place. This initial raw material extraction then already links materials, people, places and time in a complicated web. It also links activities at one place (the raw material source) with Ayn Qasiyya where the flint was ultimately put to use.

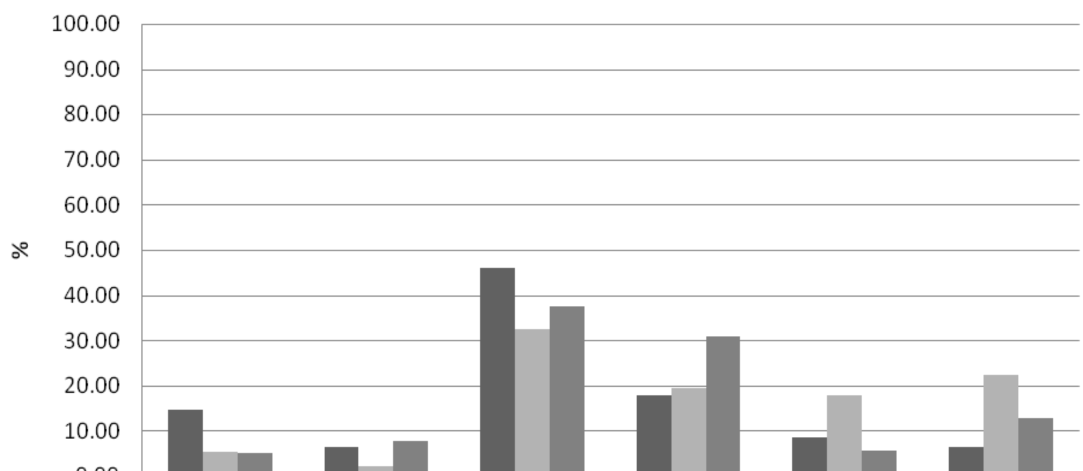
CORE REDUCTION

An understanding of the core reduction can be gained from debitage counts as well as core characteristics. As briefly mentioned in chapter 6 (Figures 6.35 & 6.36), the overall proportion of debitage classes, number of cores, and core:debitage ratios suggests that initial core flaking likely did not take place on-site. This applies to each of the excavation areas. Primary flakes average 1.11% of the overall sample. However, complete secondary flakes defined as flakes with 10-90% of cortex on the dorsal surface, average 38.67% across all assemblages, and are particularly well represented in Area A (45.95%, Figure 8.3). This frequency of secondary flake debitage indicates that although initial core flaking likely did not take place on-site, cores nevertheless arrived in a largely complete state. This suggests that the raw material sources were probably fairly close to the site, minimizing the need to carry large and heavy nodules for long distances. This is clearly supported by the high number of chips recovered during the excavations, which



	1	2	3	4	5	6	7	8	9	10	11
Area A	0.00	28.9	48.0	12.7	4.41	1.47	0.49	0.98	2.94	0.00	0.00
Area B	7.39	17.8	58.2	0.43	7.83	1.30	0.43	2.61	3.04	0.43	0.43
Area D	80.1	4.86	5.59	5.95	2.16	0.36	0.00	0.90	0.00	0.00	0.00

Figure 8.2: Debitage raw material type distribution (in %; Area A, n=204; Area B, n=230; Area D, n=555).



	Secondary Blades	Tertiary Blades	Secondary Flakes	Tertiary Flakes	Secondary Bladelets	Tertiary Bladelets
Area A	14.59	6.49	45.95	17.84	8.65	6.49
Area B	5.43	2.17	32.61	19.57	17.93	22.28
Area D	5.17	7.75	37.47	31.01	5.68	12.92

Figure 8.3: Frequency of secondary and tertiary debitage in the samples from Areas A (n=185), B (n=184) and D (n=387).

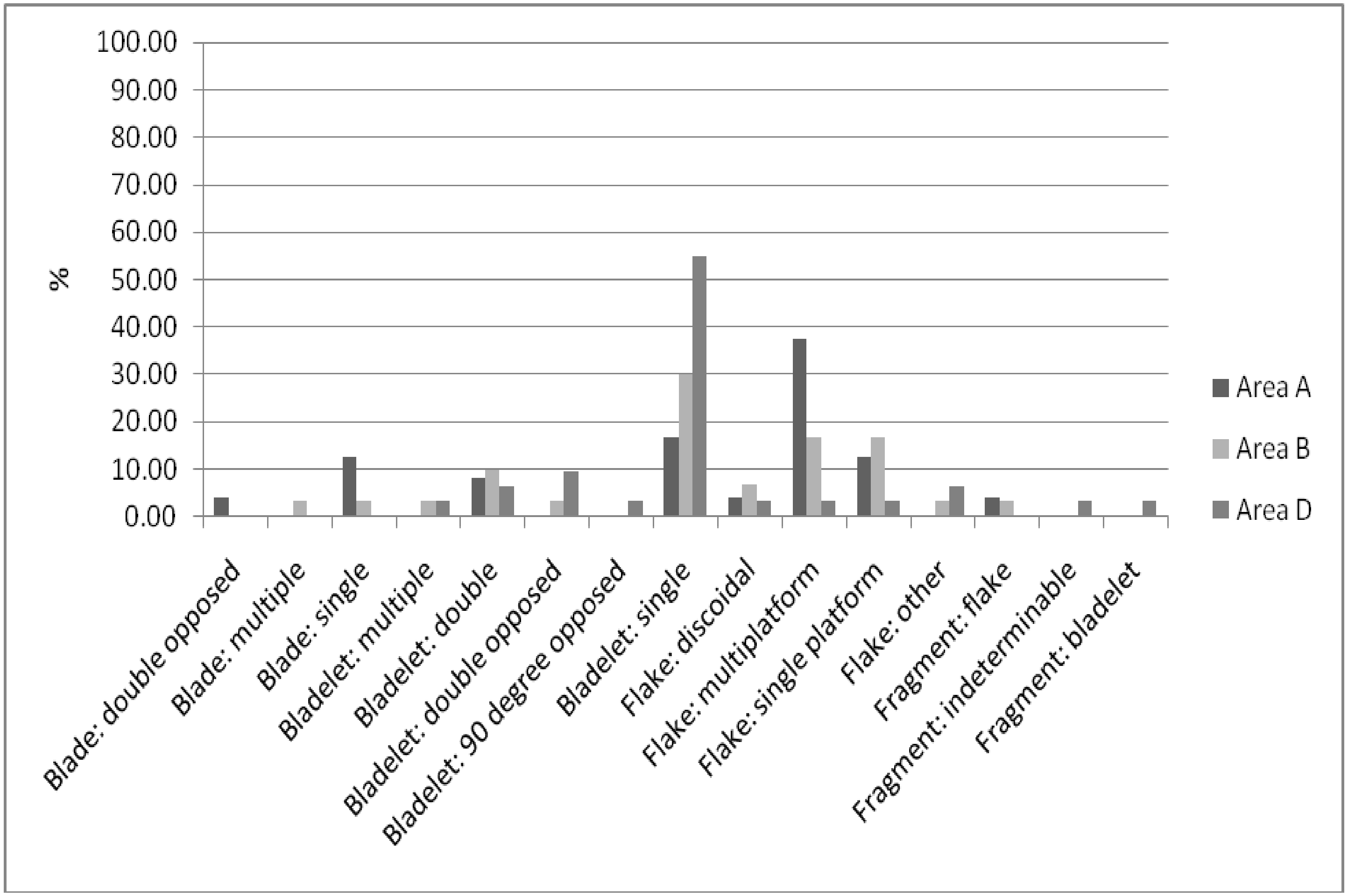


Figure 8.4: Frequency of core types in Area A, B and D sample

		Raw Material Types							
		1	2	3	4	5	6	9	10
Cortex appearance	Angular Nodule	8	7	24	5	10	1	1	
	Battered Cobble Cortex	1	1	4		1	0	1	1
	Tabular piece or block	7	0	1			1		
	Rounded nodule	1	0						

Table 8.4: Correlation of core raw material type with cortex appearance

		Absolute Core Numbers				Core Percentages		
		Area A	Area B	Area D	Total	Area A	Area B	Area D
Core Types	**Blade**							
	Blade: double opposed	1			1	4.17	0.00	0.00
	Blade: multiple		1		1	0.00	3.33	0.00
	Blade: single	3	1		4	12.50	3.33	0.00
	Bladelet							
	Bladelet: multiple		1	1	2	0.00	3.33	3.23
	Bladelet: double	2	3	2	7	8.33	10.00	6.45
	Bladelet: double opposed		1	3	4	0.00	3.33	9.68
	Bladelet: 90 degree opposed			1	1	0.00	0.00	3.23
	Bladelet: single	4	9	17	30	16.67	30.00	54.84
	Flake							
	Flake: discoidal	1	2	1	4	4.17	6.67	3.23
	Flake: multiplatform	9	5	1	15	37.50	16.67	3.23
	Flake: single platform	3	5	1	9	12.50	16.67	3.23
	Flake: other		1	2	3	0.00	3.33	6.45
	Fragment							
	Fragment: flake	1	1		2	4.17	3.33	0.00
	Fragment: indeterminable			1	1	0.00	0.00	3.23
	Fragment: bladelet			1	1	0.00	0.00	3.23
	Total	24	30	31	85	100.00	100.00	100.00

Figure 8.5: Amount and frequency of cores in the Ayn Qasiyya samples

suggest *in situ* knapping, as well as the frequent occurrence of core trimming elements (core tablets, ridged blades, face rejuvenation pieces or core repairs). The first step, therefore, appears to have been extraction of the raw material at its source accompanied here by initial flaking of the core, perhaps to test its suitability, and, if selected, transport to the site where further core reduction took place. The low number of cores and their often exhausted state (see below) suggests that the majority were not worked towards full exhaustion. If they had this should have resulted in a higher number of smaller cores. Instead, cores were heavily reduced at the site, but more often than not, they were not reduced so far to render them unsuitable for further use. The relative under-representation of cores, despite evidence for substantial on-site knapping, likely reflects the removal of suitable cores and their further reduction elsewhere. Blade, bladelet and flake cores all occur at Ayn Qasiyya. Flake cores represent a fairly substantial part of the assemblages in Areas A and B, which is also reflected by high counts of flake debitage (averaging 43.46% in all excavation areas, Table 8.5, Figure 8.4). Bladelet cores outnumber blade cores, and the former largely consist of single-platform bladelet cores, which are commonly thin and nosed, utilizing the narrow face of the nodule for bladelet removal. Opposed platform bladelet cores are rare, but bladelet cores with two platforms occur somewhat more frequently, especially in Areas A and B. The latter utilize the same part of the core and the same striking direction, with the two platforms slightly set off at a shallow angle to each other (Figure 8.5). Despite minor variations, however, there is an overriding theme uniting bladelet core morphology. As mentioned, all utilize the narrow side of the nodule, commonly retaining some cortex on one or both sides of the non-utilised sides. Platform renewal by core tablets is common and evident on many bladelet cores (Table 8.6). In terms of the bladelet cores, there is little obvious differentiation between Areas A/B and D. However, bladelet cores are very small and, in the case of Ayn Qasiyya, represent the final stage of reduction prior to discard. It seems many cores were discarded despite being not fully exhausted. Average core length, width and thickness are shown in Figures 8.7 and 8.8. In each area, flake cores tend to be wider and longer than bladelet cores. Although, only four flake cores were measured from Area D so the average longer length of bladelet cores here may not be representative. Bladelet cores are also thicker than flake cores in Areas B and D, although this relationship is reversed in Area A. The core sample from Area A represents somewhat of an anomaly, since a small concentration of rather amorphous flake cores was found here in a tightly packed position (Figure 8.9). Although this appears to have been a random depositional event, it has skewed the available sample from this excavation area toward large, multi-platform flake cores. The thicker bladelet cores in Area B and Area D may suggest a conscious selection of cores to cater for the widest possible core face. This would be crucial in bladelet reduc-

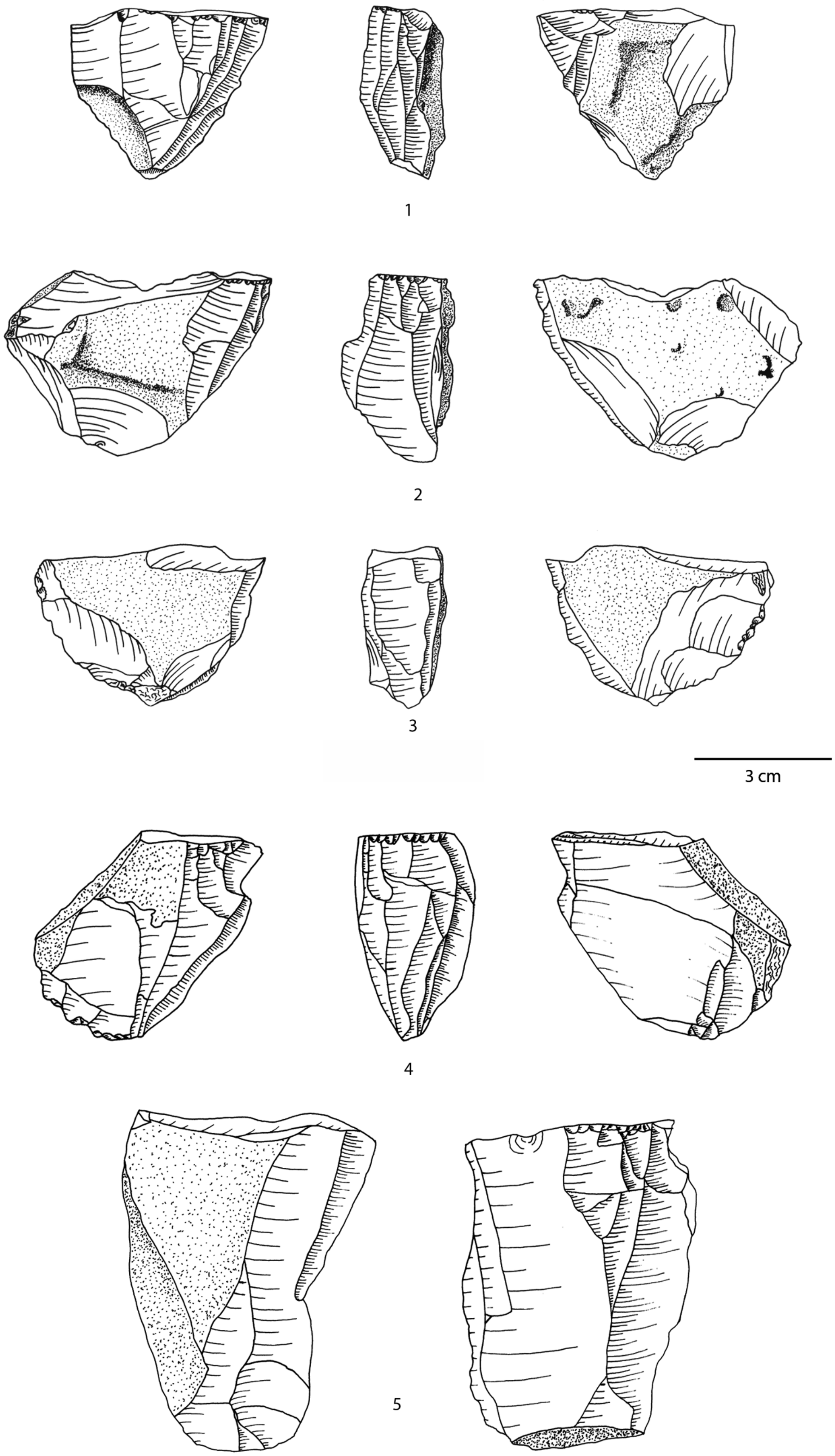


Figure 8.5: Cores from Area A and B. #'s 1-5: single platform bladelet cores. #5: single platform flake/ blade core

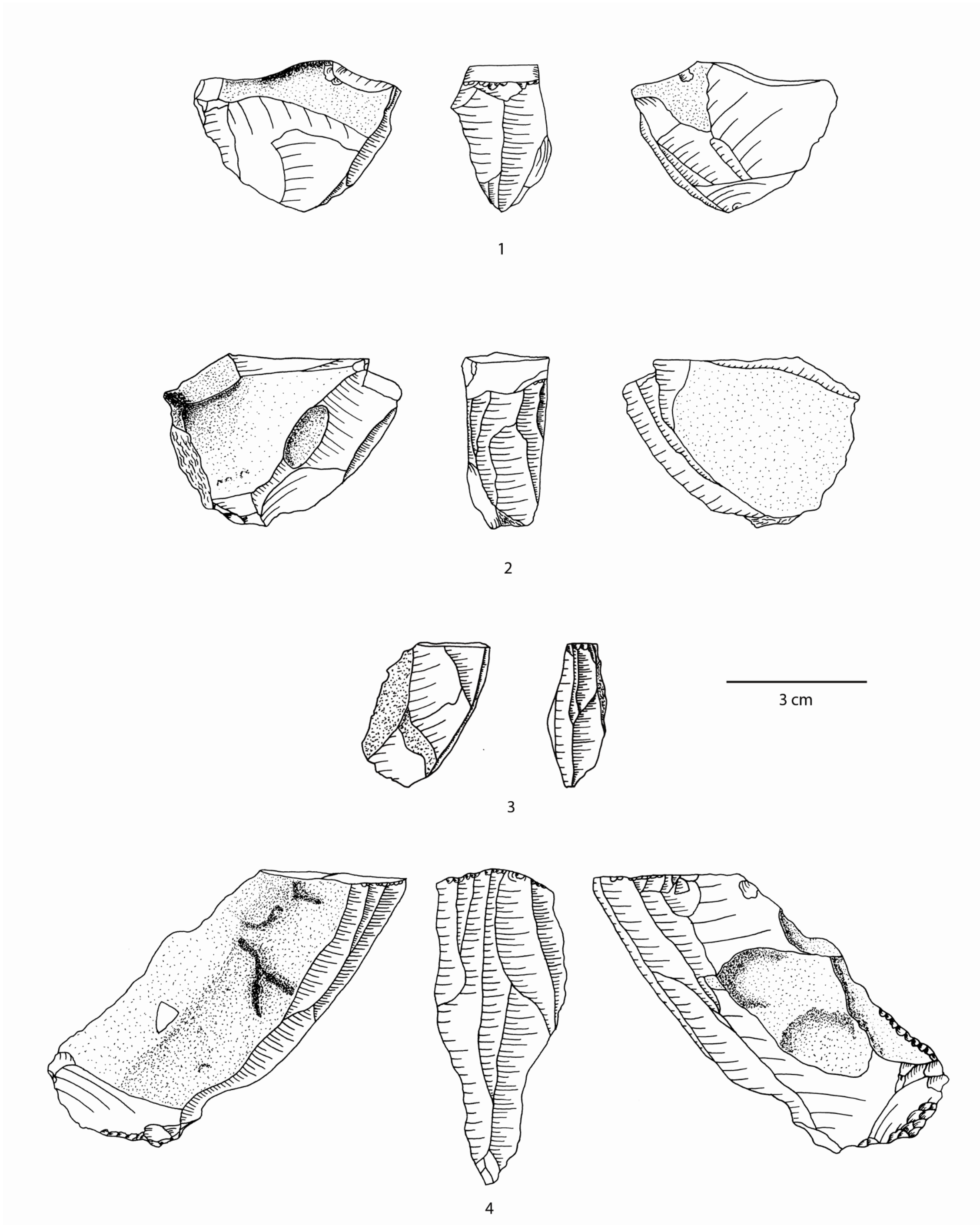


Figure 8.6: Single platform bladelet cores from Area D

	Bladelet cores platform rejuvenation		Flake Cores Platform Rejuvenation	
	Platform rejuvenated	Platform not rejuvenated	Platform rejuvenated	Platform not rejuvenated
A	3	7	2	12
B	11	3	3	8
D	17	6	3	2

Table 8.6: Platform rejuvenations in bladelet and flake cores (blade cores excluded due to low overall presence)

	Core Repair/ face rejuvenation	Core Tablet	Plunger	Ridge Blade	Partial Ridge Blade	Total
Area A	30	2	1	3	0	36
Area B	20	10	5	33	12	80
Area D	86	45	11	32	54	228

Table 8.7: Absolute numbers of core trimming elements in the Area A, B and D sample

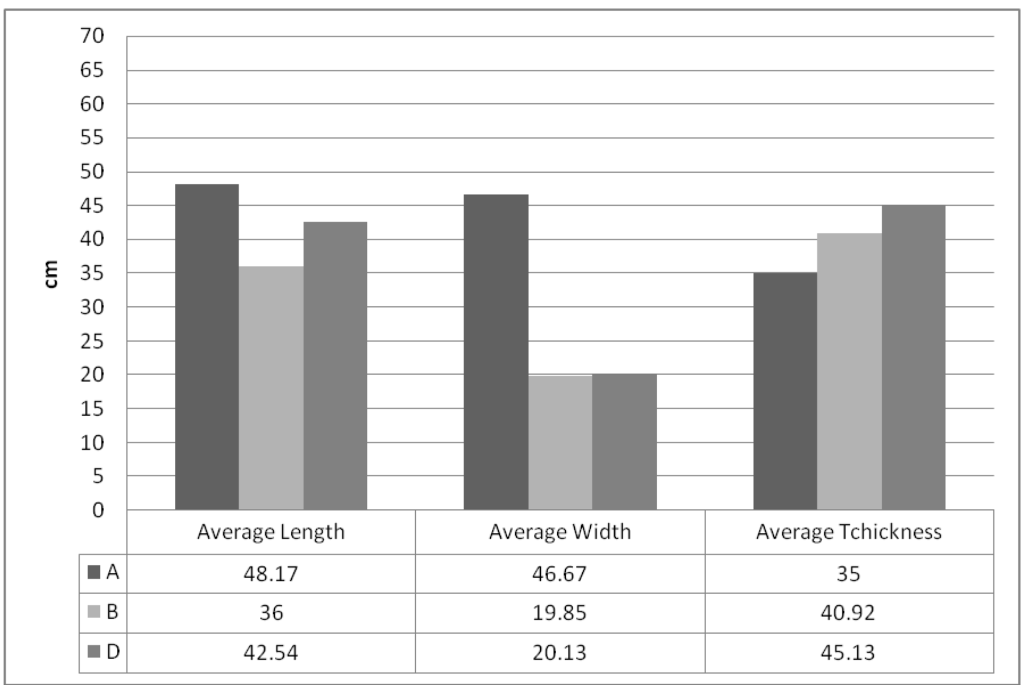
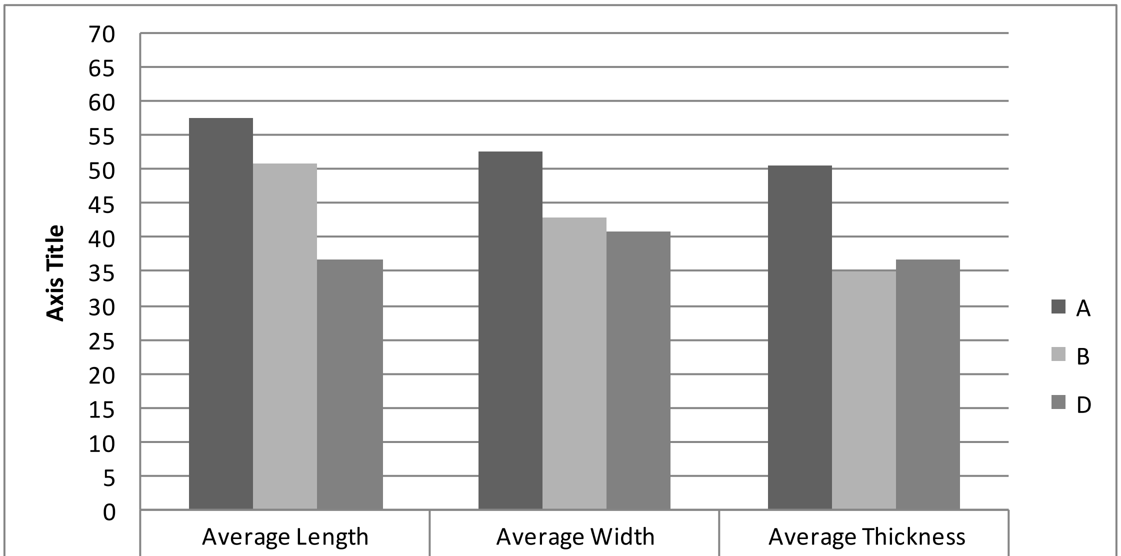


Figure 8.7: Average length, width and thickness of bladelet cores

tion to enable a sequential removal of more bladelets of a standardized width. The fairly high representation of flake cores in the Ayn Qasiyya assemblage should not be taken to indicate that core reduction was geared towards the production of flake blanks primarily as they are likely not the final removals from these cores. Figures 8.10 and 8.11 indicate that they are larger in size than bladelet cores and can be expected to represent an earlier stage in the production sequence. Their often amorphous appearance suggests that these cores were roughly shaped by flake removals for preparation as future blade or bladelet cores. Blade cores might also represent an earlier stage of reduction, where large blades are removed prior to smaller bladelets as the size of the core decreases. The high numbers of secondary flakes in all excavation areas would suggest that this proportional distribution also reflects an intensive reduction of cores in the initial stages of decortification that shifted to blade/ bladelet production at a later stage. However, the presence of secondary blades and bladelets indicates that this sequence was not the only means of core reduction. Indeed, suitable cores of the right size and exhibiting already useful platform locations and angles were likely set up as blade or bladelet cores from the outset. This appears to have particularly been the case in Area B where high numbers of secondary and tertiary bladelets are accompanied by a high representation of ridged or crested blades (41.25% of the core trimming elements, Figure 8.12 & Table 8.7). In Area D, by contrast, tertiary flakes are particularly well represented, something not matched by the presence of flake cores. Low numbers of secondary bladelets and blades suggests that the reduction sequence in Area D seems to have concentrated on simple flake reduction of the core, before shifting to bladelet production only at a late stage. This is supported by a higher index of core face rejuvenation flakes pieces of debitage that were taken off the core to remove previous knapping mistakes such as hinges or steps. These relate to the repair of knapping errors and problems arising as part of a less well prepared reduction procedure, which was associated with straightforward flake production. Core tablets are also more numerous in the Area D assemblage which suggests that platforms may have been exhausted quickly and required more regular refreshing by tablet removal to change platform shape. This is consistent with a more forceful reduction associated with direct hard or soft hammer flaking, where platforms are often crushed. This point will be revisited shortly in the discussion of blank production below. In Area D there is also a higher representation of partial ridge blades. This category of core trimming elements was define to accommodate the quantification of pieces on which ridges were only partially prepared, commonly toward the distal end. In some cases this appears to have been used to remove some knapping mistakes on the core face, so that partial ridged blades share some common ground with core face rejuvenation pieces. However, the preparation of partial ridges also facilitated, it seems, correction of the overall



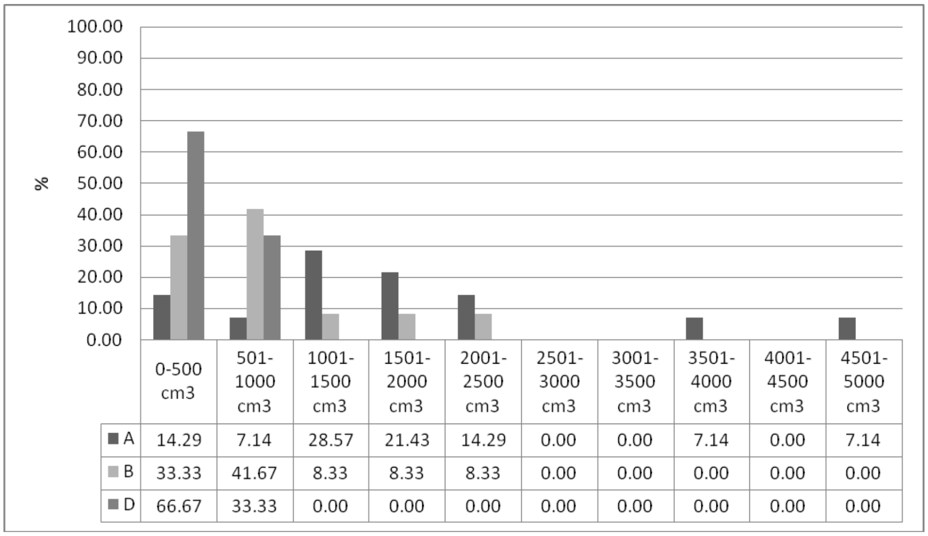
	Average Length	Average Width	Average Thickness
A	57.5	52.71	50.57
B	50.77	42.92	34.92
D	36.75	40.75	36.75

Figure 8.8: Average length, width and thickness of flake cores

Figure 8.9: Concentration of large flake cores deposited in an unsorted condition within Area A.

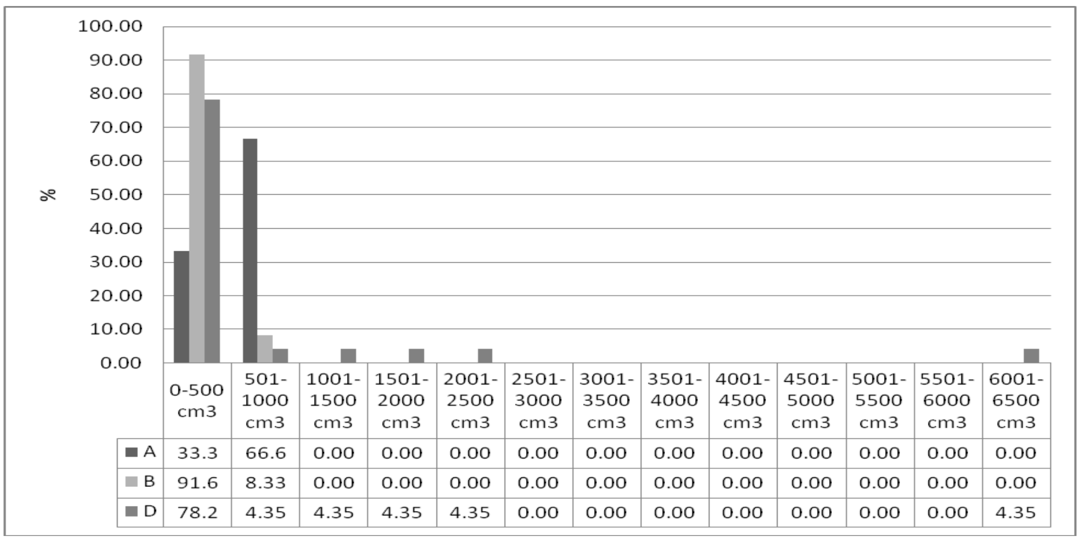
inclination of the face versus the platform, to facilitate debitage removal. This would make sense in a situation where the initial core reduction occurred by flaking with a later switch to bladelet removal, since this would require amendments to the core face and platform angle. It would also facilitate the switch from removing elongated flakes to blades and bladelets proper, since the creation of a partial ridge would guide the force of the hammer strike further along the piece. The proposed correction of the distal curvature and angle of the piece suggested by the preponderance of partial ridge blades may also be consistent with soft hammer reduction where the aim is to hit the core at an angle that pulls the piece away from the nodule (Crabtree 1972; Whitaker 1995). With respect to core trimming elements, Area A has an unusually high number of core face rejuvenation pieces (83.33%) when compared to the other excavation areas. This dominance of face rejuvenation flakes is difficult to explain given the available data and may reflect an inherent bias in the available sample. It appears that in Area B cores were more commonly set up initially for blade and bladelet reduction when compared to Area D. Consequently, the initial core set up also varied. In Area D initial core reduction by removing flakes was more common and initial platforms were likely established by splitting the nodule or removing an initial suitable flake. In some instances it appears that ridged blades were used to prepare the removal of a slender ridged blade which usually exhibits a large amount of cortex to create a narrow platform at either end of a flat nodule. This would then lead to the working of one narrow face of the nodule.

Therefore, it appears two pathways were used with varying degrees of importance. The first path produced larger, chunkier nodules by flaking into suitable initial shapes, at which point production shifted towards blades and bladelets by establishing crests and suitable platforms. This path was particularly prevalent in Area D, as evidenced by the abundance of secondary and tertiary flake debitage, core face rejuvenation flakes, core tablets and partial ridged blades. The second method was a more direct approach that aimed for blade/bladelet reduction at the outset of the sequence. Using suitably flat nodules, an initial platform was prepared either by splitting the nodule or by removing a ridged blade as part of platform preparation. The narrow sides of the flat nodule were then utilized as faces for bladelet removal. In Area B this method appears to have been preferred, as reflected by the high number of proper ridged blades, and lack of other types of core trimming elements, in the assemblage. An examination of the dorsal scar removal directions in the sample of complete debitage shows that there is little variation between areas or across debitage classes (Figures 8.13, 8.14 & 8.15). In each debitage class, the dorsal removal directions mirror those of the removal direction of the positive piece. There is somewhat more variation amongst secondary and tertiary flakes. One would naturally expect a somewhat higher degree of variation in removal direction



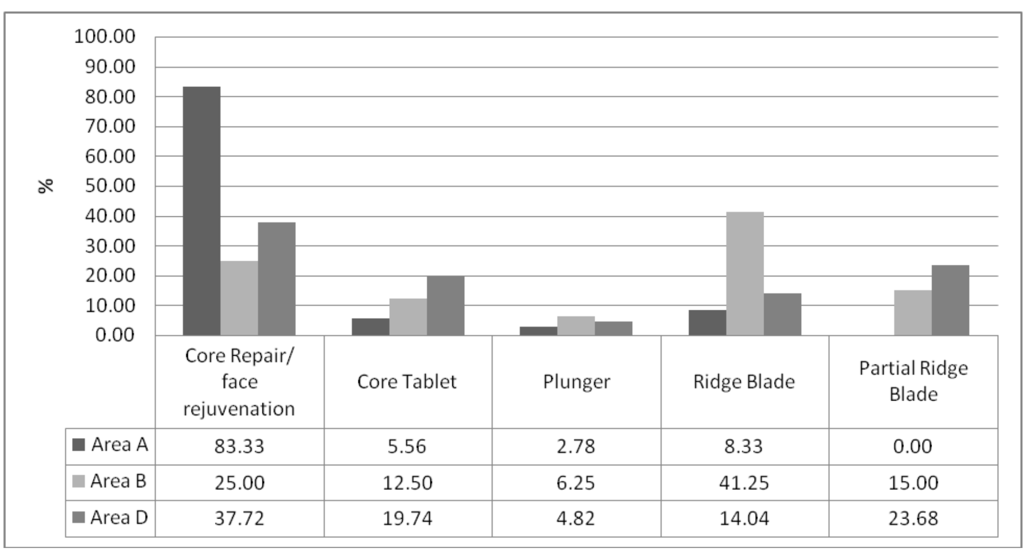
	0-500 cm3	501-1000 cm3	1001-1500 cm3	1501-2000 cm3	2001-2500 cm3	2501-3000 cm3	3001-3500 cm3	3501-4000 cm3	4001-4500 cm3	4501-5000 cm3
A	14.29	7.14	28.57	21.43	14.29	0.00	0.00	7.14	0.00	7.14
B	33.33	41.67	8.33	8.33	8.33	0.00	0.00	0.00	0.00	0.00
D	66.67	33.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure 8.10: Volume of flake cores in Areas A (n=14), B (n=12) and D (n=3)



	0-500 cm3	501-1000 cm3	1001-1500 cm3	1501-2000 cm3	2001-2500 cm3	2501-3000 cm3	3001-3500 cm3	3501-4000 cm3	4001-4500 cm3	4501-5000 cm3	5001-5500 cm3	5501-6000 cm3	6001-6500 cm3
A	33.3	66.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B	91.6	8.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D	78.2	4.35	4.35	4.35	4.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.35

Figure 8.11: Volume of bladelet cores in Area A (n=6), B (n=12) and D (n=23).



	Core Repair/ face rejuvenation	Core Tablet	Plunger	Ridge Blade	Partial Ridge Blade
Area A	83.33	5.56	2.78	8.33	0.00
Area B	25.00	12.50	6.25	41.25	15.00
Area D	37.72	19.74	4.82	14.04	23.68

Figure 8.12: Frequency of core trimming elements in the Area A (n=36), B (n=80) and D (n=228) sample

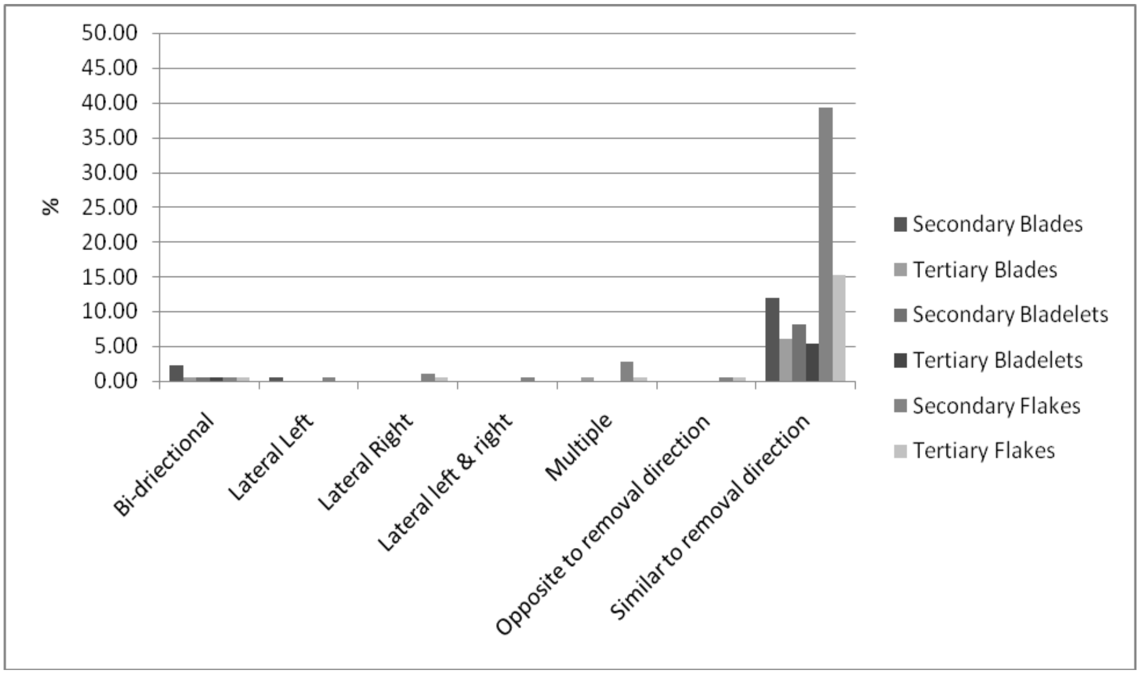


Figure 8.13: Dorsal removal scar directions on complete debitage in Area A (n=183)

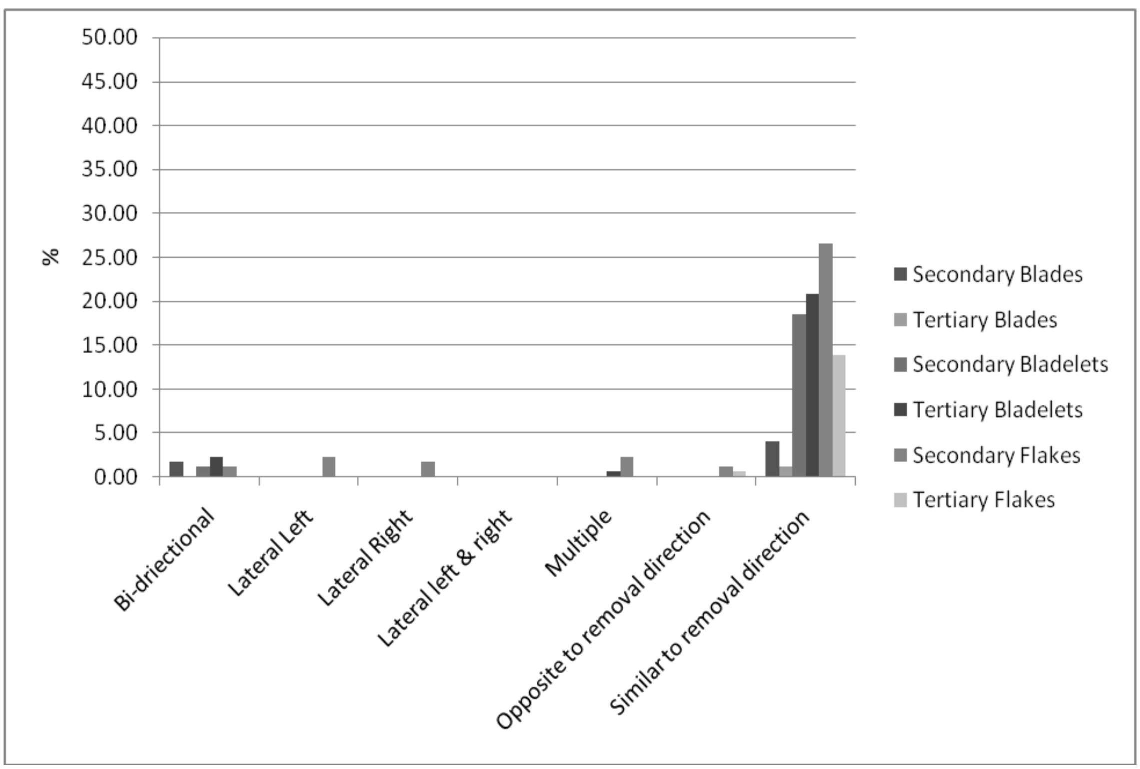


Figure 8.14: Dorsal removal scar directions on complete debitage in Area B (n=173)

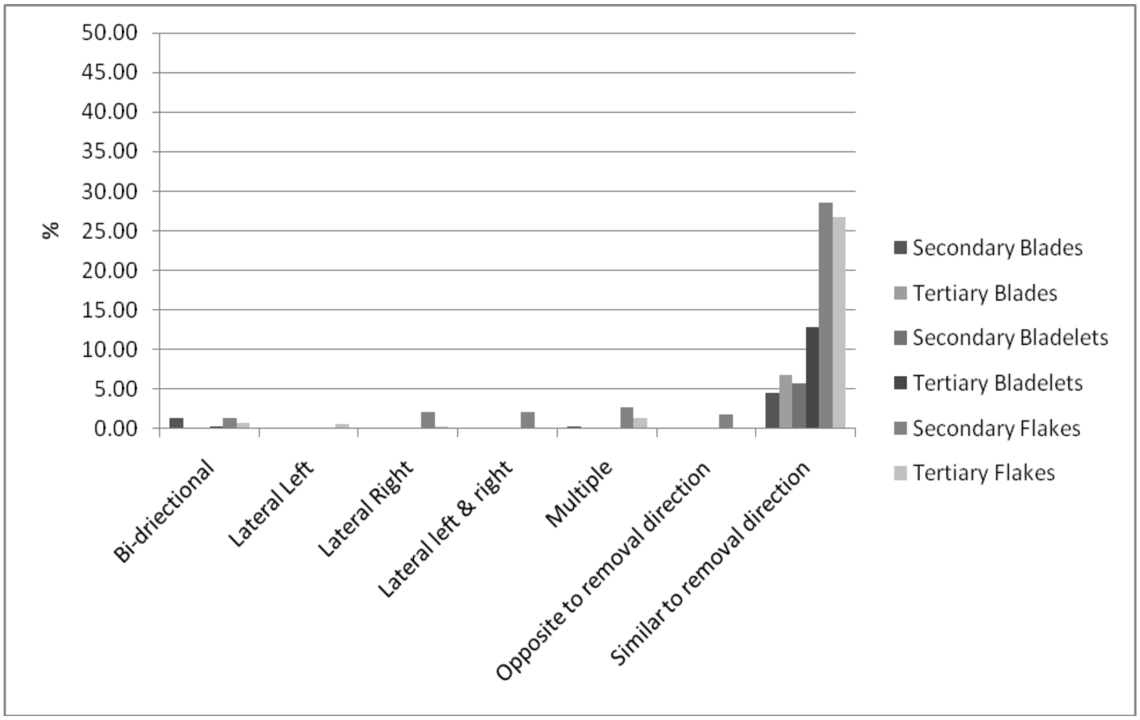


Figure 8.15: Dorsal removal scar directions on complete debitage in Area D (n=381)

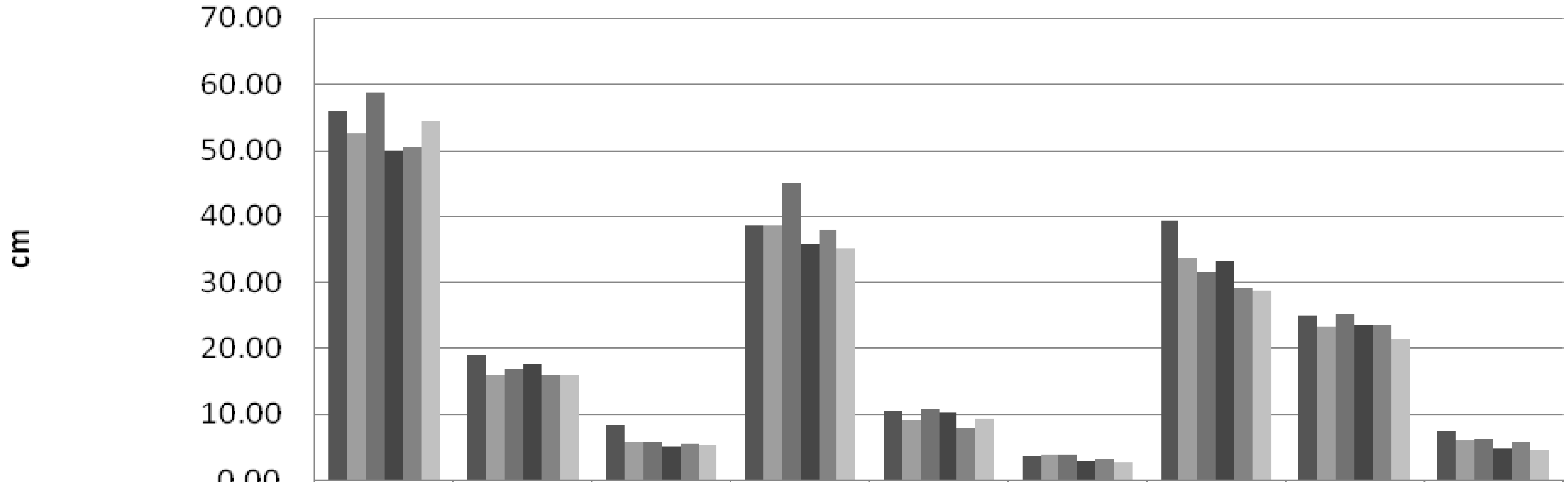
and core orientation amongst flake debitage when compared to blades and bladelets. This data mirrors that available from the core classification which shows that unidirectional cores clearly predominate. Thus, knappers more often than not attempted to maintain a distinct directionality for removals, whether they were working flake or blade/ bladelet cores.

In addition to cores, it is necessary to discuss the role and status of two other types of artefacts: splintered pieces and burins. Both burins and splintered pieces (*pieces esquilles*) were found in the samples discussed here. Burins account for 3 4% of the retouched samples from each area (Figure 8.50; Table 8.10 and 8.11), whereas two splintered pieces were found in Area B and Area D. The understanding of burins primarily as tools has recently come under scrutiny by a number of researchers (Barton et al. 1996; Büller 1983; Coinman 2000; Finlayson & Betts 1990; Sackett 1989; Tomaskova 2005). This re-evaluation revolves around the absence of use-wear traces on burins themselves, a number of burin types, as well as the recognition that some burin spalls closely resembled bladelets and were as such modified into microliths. This suggests that not all burins can be straightforwardly considered as tools, but acted in fact as cores. In the absence of use-wear analyses, the nature of burins in the Area A/B and D samples cannot be evaluated. From a macroscopic perspective, many edges created by burin detachment do not appear to be suitable for utilization and macroscopic wear traces were not consistently observed on them. At the same time, burin spalls are not as common amongst the debitage suggesting that burin spalls may not have been a desired end product, were misidentified, or that they are not present in the assemblages for other reasons. Raw material scarcity, which would lead to an inferred rise in the importance of burins as cores to maximize raw material use, cannot be inferred from the available data. Although many cores are relatively exhausted, raw material is plentiful in the local area and the overall debitage proportions at the site do not indicate a particularly conservative use of raw materials. It seems therefore that burins may have played equal roles as sources of debitage and serving as tools, although further examination of the burins is required to make a more definitive judgement.

Splintered pieces are not uncommon at Upper Palaeolithic and Epipalaeolithic sites in the region. Using fairly thick flakes which are rested on an anvil and than hammered to detach debitage, splintered pieces are defined morphological on the basis of negative scars on dorsal and ventral surface and distal and proximal ends. These areas are often also accompanied by distinct crushing where the piece was rested on the anvil. Their frequent occurrence is also a likely indicator for raw material scarcity and a more extensive utilisation of existing raw materials. Consequently, their relative rarity in the Ayn Qasiyya samples suggests that raw material scarcity was not a compelling factor in this case. The use of splintered pieces to maximize raw material reduction was *ad hoc* and uncommon.

BLANK PRODUCTION

Assessing the selection of suitable pieces of debitage for further manufacture into tools is not straightforward. This is because both macroliths and microliths occur in the Ayn Qasiyya assemblage and their production was guided by different selection criteria. Blanks for macrolith production include both secondary and tertiary blades and flakes formed into scrapers, truncations, notches and denticulates and other miscellaneous retouched tool types. These were likely selected from debitage accumulated as part of the general core reduction, particularly in Area D, where there are fewer flake cores. In Areas A and B, where flake cores are more numerous, a separate sequence of reduction may have been used, which was at times geared specifically toward the production of flake blanks. Where microliths are concerned, it has been argued above that in Area B a distinct knapping sequence existed that was specifically geared towards the production of bladelets. Here, the bladelet blank production sequence is somewhat more clearly represented. In Area D, however, where it appears that blade/bladelet production occurred as part of a later switch during a more generalized reduction sequence, the production of tool blanks may be more blurred. In the following discussion all debitage is considered, although tertiary pieces were in many cases more often selected due to their lack of cor-



	Blades			Bladelets			Flakes		
	Average Length	Average Width	Average Thickness	Average Length	Average Width	Average Thickness	Average Length	Average Width	Average Thickness
Secondary Area A	55.78	19.15	8.52	38.69	10.56	3.81	39.48	24.98	7.53
Secondary Area B	52.50	16.00	5.80	38.59	9.28	3.94	33.72	23.45	6.12
Secondary Area D	58.74	17.04	6.00	45.09	10.95	4.00	31.66	25.12	6.40
Tertiary Area A	49.92	17.62	5.23	35.83	10.42	3.00	33.27	23.58	4.94
Tertiary Area B	50.33	16.00	5.67	38.02	8.12	3.29	29.34	23.67	5.78
Tertiary Area D	54.54	16.04	5.42	35.02	9.51	2.92	28.82	21.45	4.62

Figure 8.16: Average length, width and thickness of complete secondary and tertiary blades, bladelets and flakes in Areas A , B and D.

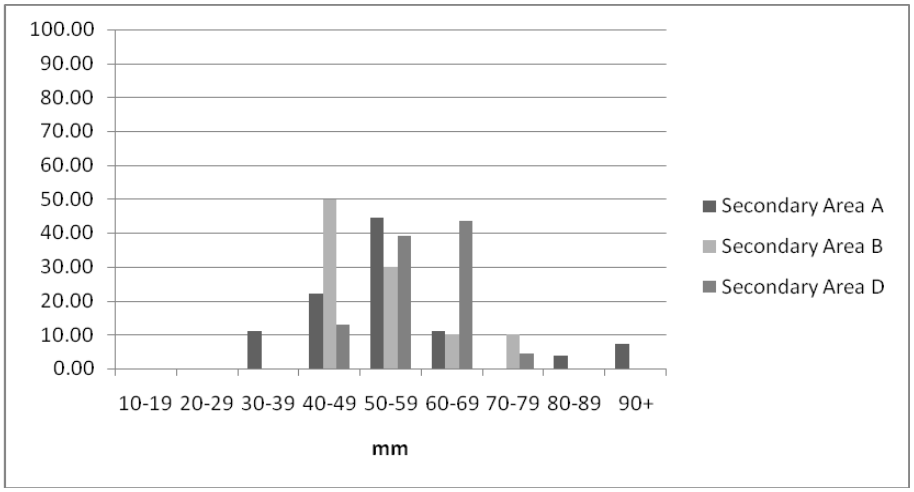


Figure 8.17: Length distribution of secondary blades in Areas A, B and D

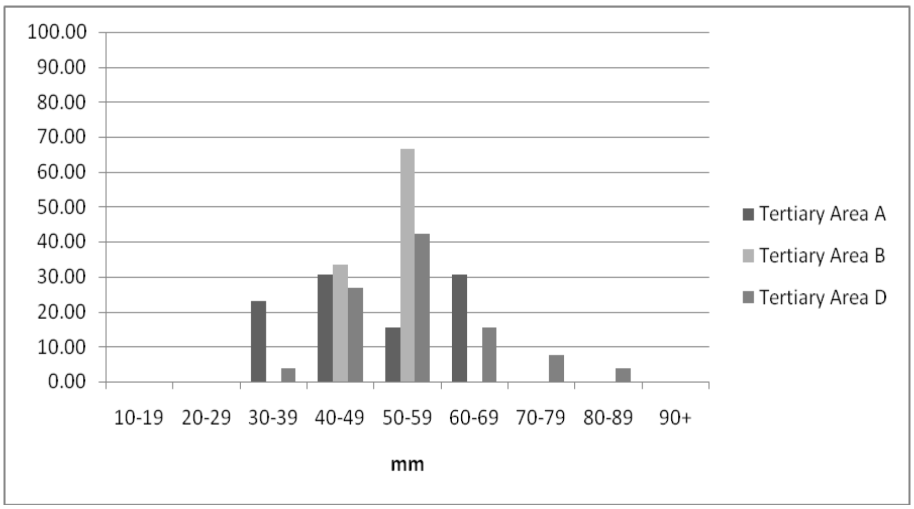


Figure 8.18: Length distribution of tertiary blades in Areas A, B and D

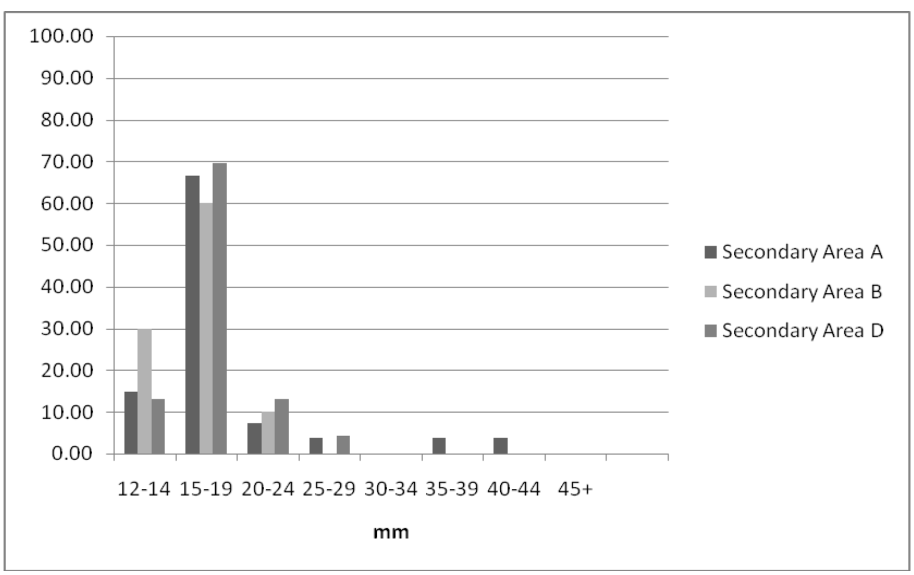
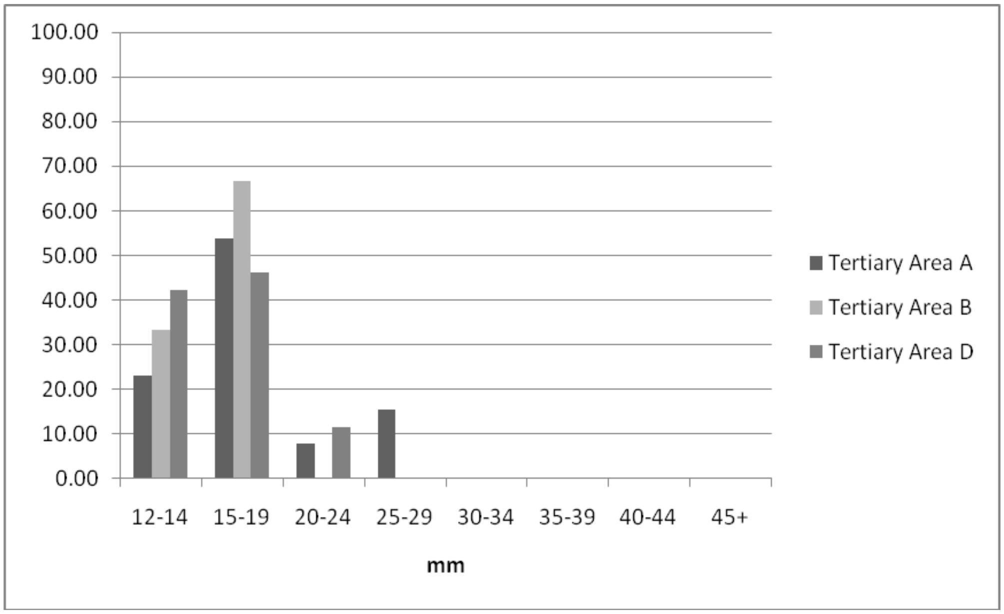
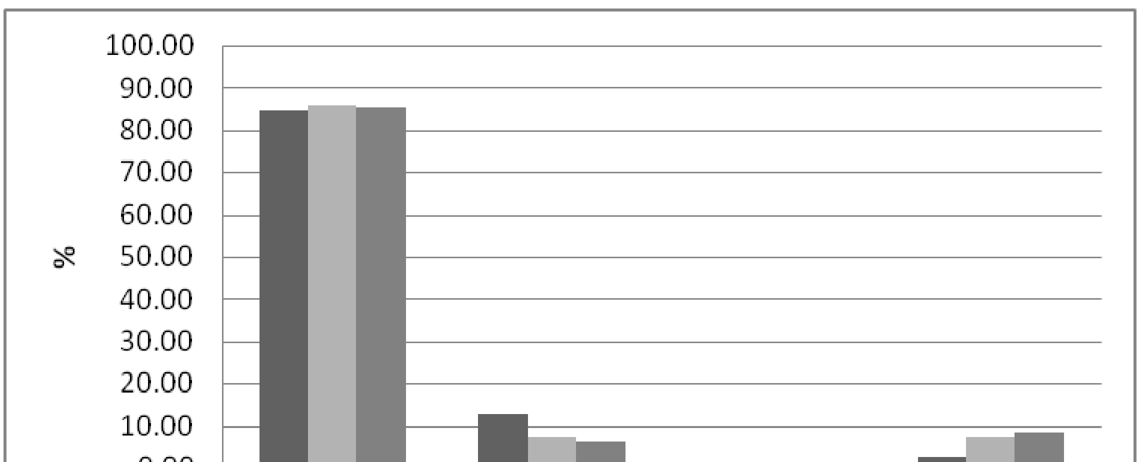


Figure 8.19: Width frequency distribution of secondary blades in Areas A, B and D

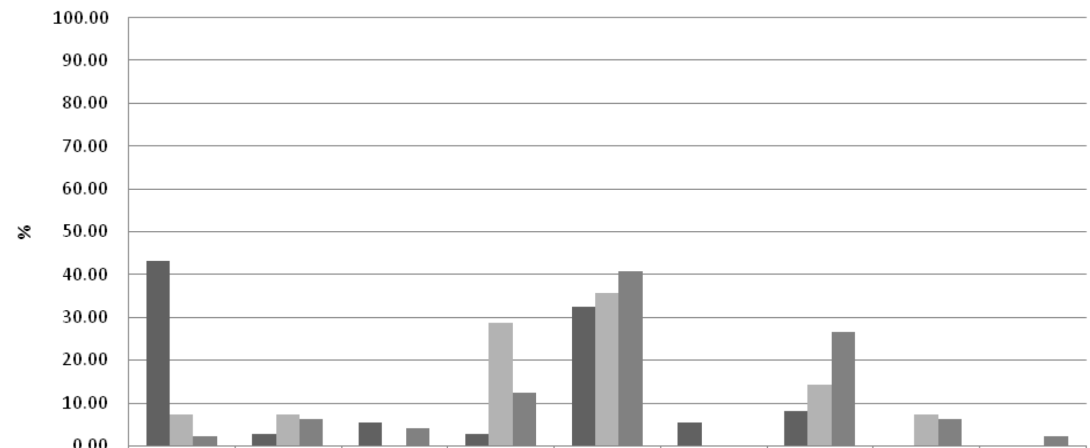


Figures 8.19: Width frequency distribution of tertiary blades in Areas A, B and D



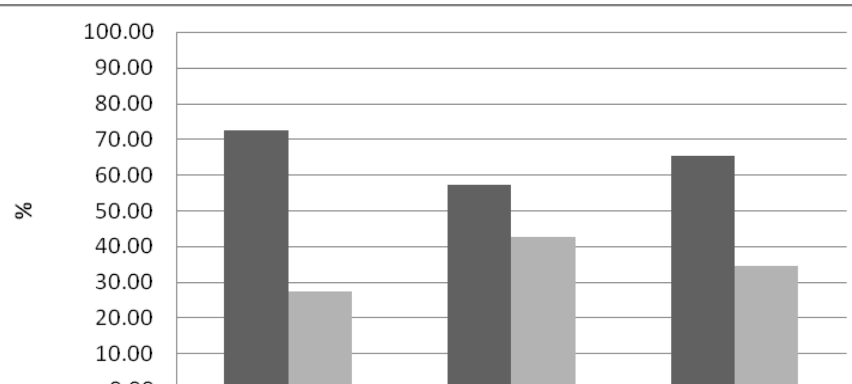
	Feather	Hinge	Step	Plunge
Area A	84.62	12.82	0.00	2.56
Area B	85.71	7.14	0.00	7.14
Area D	85.42	6.25	0.00	8.33

Figure 8.20: Blade debitage termination types (Area A: n=39; Area B: n=14; Area D: n=48)



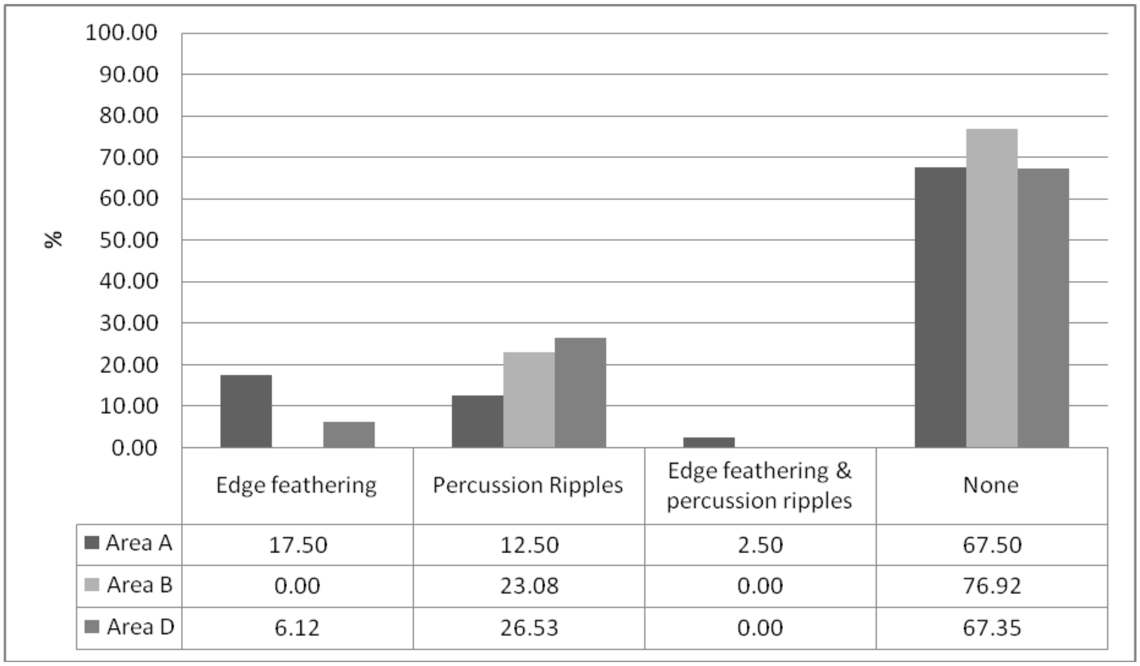
	Cortical	Dihedral	Facetted	Punctiform	Flat	Linear	Thin	Winged	Spur
Area A	43.24	2.70	5.41	2.70	32.43	5.41	8.11	0.00	0.00
Area B	7.14	7.14	0.00	28.57	35.71	0.00	14.29	7.14	0.00
Area D	2.04	6.12	4.08	12.24	40.82	0.00	26.53	6.12	2.04

Figure 8.22: Blade platform types (Area A: n=37; Area B: n=14; Area D: n=49)



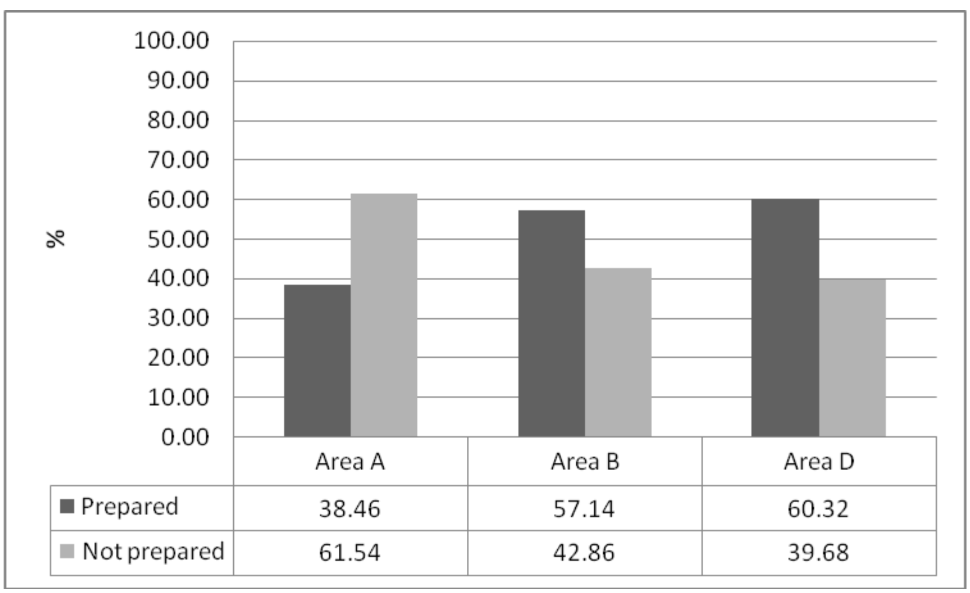
	Area A	Area B	Area D
Diffuse	72.50	57.14	65.31
Pronounced	27.50	42.86	34.69

Figure 8.23: Frequency of lipped versus non-lipped platforms amongst blade debitage (Area A: n=40; Area B: n=12; Area D: n=49)



	Edge feathering	Percussion Ripples	Edge feathering & percussion ripples	None
Area A	17.50	12.50	2.50	67.50
Area B	0.00	23.08	0.00	76.92
Area D	6.12	26.53	0.00	67.35

Figure 8.24: Frequency of different types of ventral characteristics amongst blade debitage (Area A: n=40; Area B: n=13; Area D: n=49)



	Area A	Area B	Area D
Prepared	38.46	57.14	60.32
Not prepared	61.54	42.86	39.68

Figure 8.25: Frequency of platform preparation evident on blade debitage (Area A: n=39; Area B: n=14; Area D, n=63)

tex. However, macrolithic retouched pieces with cortex do occur, indicating that secondary debitage was at times also selected for secondary modification. Furthermore, since blade and bladelet production is part of a planned strategy of core reduction leading to the production of distinct blanks, it is important to consider secondary debitage in this discussion to elucidate the overall sequence of knapping activities and reveal technological patterns.

BLADE DEBITAGE

The following discussion is based on the detailed technological analysis of 102 blades from the Ayn Qasiyya assemblages. Blades average a length of 53.64 mm, with little apparent variation between the excavation areas (Figure 8.16). Secondary and tertiary blades in Area B are subtly shorter than blades in Area D, while secondary and tertiary blades in Area A tend to be slightly wider and thicker. In general, though blades have a fairly uniform appearance across the entire site. Figure 8.17 shows that in Area B the majority of secondary blades falls within the 40-49 mm group, while tertiary blades largely fall into the 50-59 mm group (Figure 8.18). This suggests that somewhat longer blades were produced following complete de-cortification. This tendency is not apparent in Area D, where secondary blades tend to be larger than tertiary blades. In Area A blades of all lengths are more evenly distributed in the secondary and tertiary blade groups. Tertiary blades tend to be widest in Area B, although there is a general conformity in blade width across all excavation areas and amongst secondary and tertiary blades (Figures 8.19 and 8.20). The only exception appears to be a large number of 40-49 mm-wide secondary blades in Area B.

There does not appear to be any significant pattern or variation associated with the length and width distributions of blades on the intra-site level. A high degree of feather terminations (>80% in each excavation area, Figure 8.21) suggests a high degree of skill in the execution of blade removals. Hinge terminations are highest in Area A, with plunging terminations dominating in Areas B and D. Figure 8.22 shows the platform types of blades in each excavation area, and indicates differences between each of the three assemblages. In Area A, cortical platforms are particularly common, although flat platforms are also numerous. This suggests that platforms may not have always been prepared at the outset of setting up a core for further reduction. The majority of blades containing cortical platforms are secondary blades, so that the presence of cortical platforms can be seen as a function of an early stage of reduction. Area B has a more mixed representation of platform types, but the prevalence of punctiform platforms is noticeable. These are much more numerous then in Area A and D. This indicates subtle differences in hammering technique. The causes underlying this variation can be very varied. They range from the type of hammer used (soft hammer or indirect percussion), the point of impact on the platform, the weight of the hammer, velocity of the blow, and platform preparation (in particular whether platforms were isolated or not) to the platform angle (Cotterell and Kamminga 1982; Hayden and Hutchinson 1989: 253; Ohnuma and Bergman 1982: 169; Pelcin 1997: 1111-1112; Whittaker 1994). However, flat platforms are actually more common than punctiform platforms, which is a trait Area B shares with Areas A and D. In Area D, flat and thin platforms are the most common type. Diffuse bulbs of percussion dominate amongst all the blade debitage, although there are a slightly higher number of pronounced bulbs evident in Area B (42.86%; Figure 8.23). Flat and dihedral versus punctiform platforms are not mutually exclusive and can occur in both techniques. Additional technological data concerning the blade debitage is more ambiguous. With respect to the presence of lipped platforms and ventral features, there is little discernable variation between Areas A, B and D (Figure 8.24 and 8.25). Platform preparation on blade debitage characterised by edge grinding or rubbing is more common in Area A than in any of the other areas (Figure 8.26). This suggests a greater degree of preparation prior to blade removal. The blade sample from Area B does appear to be too limited in size to make it assessable with respect to these categories also. Overall, differences between percussion methods is hard to establish on the basis of bulb and ventral side characteristics, since neither can be considered totally reliable or mutually exclusive indicators for technique. In this respect, the platform type should be considered as a somewhat more reliable proxy for detecting differences in the removal technique.

BLADELET DEBITAGE

Bladelet debitage served as the primary source for microlithic tool blanks and are therefore a critical aspect of the technological system. Because of the commonalities in manufacturing procedure bladelets share a lot of attributes with blades and their division into two separate categories and how these are defined are debatable (Tixier 1963). The division between the two is maintained for the purpose of this discussion, since a fairly clear size differentiation can be drawn between the two categories in the Ayn Qasiyya assemblage (bladelets are here defined as up to 12 mm in width). Across the entire assemblage the average length of bladelets is 38.54 mm (Figure 8.16). There are few differences in the average lengths of bladelets except for the average longer secondary bladelets in Area D. Bladelets also have a fairly uniform width, although the bladelets in Area B are particularly gracile with an average of 8.12 mm for tertiary bladelets. In terms of length, there is a fairly even spread across the different length classes (Figure 8.27, 8.28, 8.29 and 8.30) across the three assemblages. One exception is Area B, where 50% of the bladelets are between 40-49 mm-long. This hints at fairly regularized, even standardized manufacture. A spike in this group also occurs amongst the tertiary bladelets, although they are not as numerous in Area B as 30 39mm long bladelets. Aside from this there is once again little variation between the three areas. Area B secondary and tertiary bladelets appear once again narrower when plotted according to size groups in Figures 8.25 and 8.26. Although there is clustering of secondary bladelets in the 12 mm group and indeed amongst the tertiary bladelets in Area A, tertiary bladelets in Area B tend to be more evenly spread in the less then 11 mm-wide groups. This may indicate a preference for narrower, more gracile bladelets in Area B. Terminations of bladelets once again show a high degree of uniformity across the three excavation areas, with high numbers of feather terminations (>75%) in all three excavation areas (Figure 8.31). Hinge and step terminations amongst bladelets are somewhat higher in Area A, which repeats a pattern observed amongst the blade debitage (see above).

Turning to platform types (Figure 8.32), a higher number of cortical platforms occurs in Area A. Flat, punctiform and thin platforms are, however, also present in almost equal measure in Area A. Platform type data for bladelets in Area B reveals a highly interesting pattern, with punctiform platforms numbering more than 50%. This is a much higher representation of punctiform platforms than in Areas A and D. Thin platforms are the second most important platform type amongst bladelet debitage in Area B. In contrast, in Area D flat and thin platforms are most prevalent[9]. As previously noted, punctiform platforms cannot be directly related to specific knapping techniques, except to say that they commonly occur both in soft-hammer reduction and indirect percussion (Cotterell and Kamminga 1982; Hayden & Hutchings 1989: 253; Ohnuma and Bergman 1982: 169; Newcomer 1975; Pelcin 1997: 1111-1112). Again, the wide range of factors influencing platform shape preclude the precise definition of what the cause of this difference is. But it can be said that there is a significant difference in the way that cores were prepared and reduced between Areas B and D. While the presence of some punctiform platforms in Areas A and D indicates that there is no clear division, other data discussed previously, such as the prevalence of core tablets in Area D versus a dominance of ridged blades in Area B, also indicates that there are differences in core preparation and reduction. More than 78% of bulbs are diffuse across the three excavation areas, which indicate that there is no variation with regards to this category (Figure 8.33). The occur-

9: The significance of a higher number of bladelets with punctiform platforms in Area B can be statistically verified using a chi square test in which punctiform versus non punctiform platforms amongst bladelets are contrasted. The result of the chi square test is 0.006110691, indicating that the null hypothesis is the most likely explanation for the observed variability. This suggests that the dominance of punctiform platforms in Area B bladelets is a real pattern rence of lipped platforms is however more interesting. In Area B, lipped platforms occur less often than in Areas A and D (Figure 8.34)[10]. The occurrence of punctiform platforms correlates well with the occurrence of lips on platforms amongst the bladelet debitage in Area B, which supports the idea that differences in knapping technique exist between Areas A and D. While these cannot be further elucidated given the high number of proxies causing these variations, it seems that these differences reflect habitual differences in lithic manufacture. Due to the amount of energy necessary for the detachment of bladelets, data on the ventral characteristics of bladelets is of little use in elucidating differences between the three assemblages. The collected data indicates that the majority of bladelets have few ventral characteristics, with only a few pieces displaying ripple marks (Figure 8.35). The degree of platform preparation is particularly high amongst bladelets in Areas B and D (>66%, Figure 8.36), which suggests that bladelet removal was carefully planned and executed.

An additional aspect of the blank production for microlithic tools is the application of the microburin technique. The use of this technique has been used as an important identifying marker for differentiating between the so-called Kebaran industry (with a lack of the microburin technique) and the Nebekian (with habitual use of the microburin technique) (Bar-Yosef 1987b; Belfer-Cohen & Goring-Morris 2003; Byrd 1998; Byrd 1994b; Byrd & Garrard 1989; Goring-Morris 1995; Goring-Morris & Belfer-Cohen 1998; Goring-Morris et al. 2009; Henry 1974, 1995; Olszewski 2001b, 2006). The microburin technique is understood as a technique used to section bladelets into shorter sections, which served as pre-forms for the production of retouched microliths (Inizan 1992; Tixier 1963). At Ayn Qasiyya there is a very clear difference in the use of the microburin technique when Areas A and B are compared with Area D. This variability in the use of the microburin technique was one of the initial differences recognized between the two assemblages during sorting in the field. The use of the microburin technique can be identified on the basis of diagnostic waste material and residual microburin scars on microlithic tools (Brezillon 1968; Tixier 1963; Tixier and Newcomer 1974). Table 8.8 shows the clear difference between Areas A and B on the one hand, and Area D on the other, with a total of 89 microburin related pieces in Area D, versus a total of 4 in Areas A and B combined. The significance of the microburin technique is clearly demonstrated by calculating the microburin index and the restricted microburin index for the three assemblages (Bar-Yosef 1970). With an index of 28.21, Area D registers far above Areas A and B (9.2 combined). It is therefore beyond doubt that the microburin technique was habitually used in Area D, but not in Areas A and B; accompanied by a significant difference in

10: This pattern is statistically verified using a chi square test, which produces a result of $2.59648x10^{07}$, confirming the null hypothesis

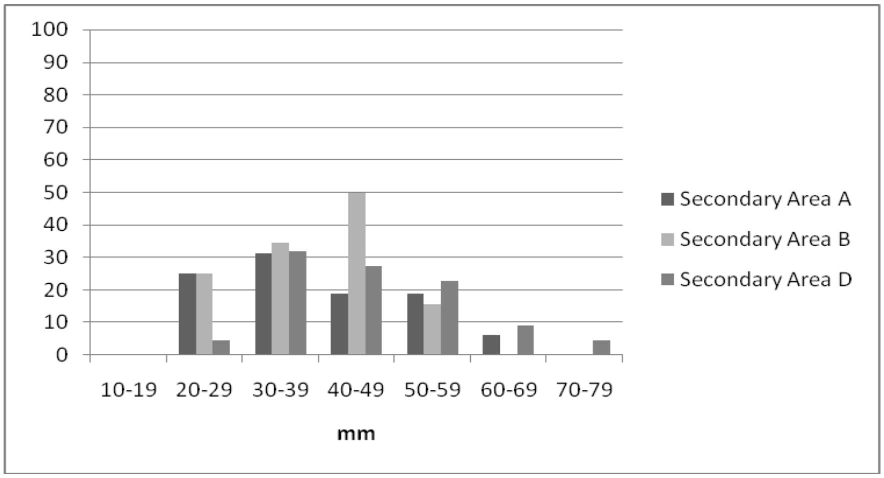


Figure 8.26: Length frequency distribution of secondary bladelets in Areas A, B and D

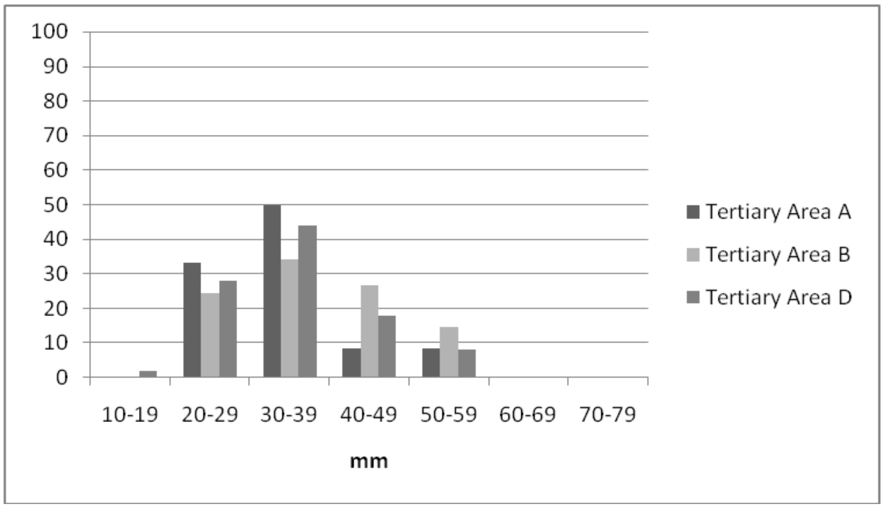


Figure 8.27: Length frequency distribution of tertiary bladelets in Areas A, B and D

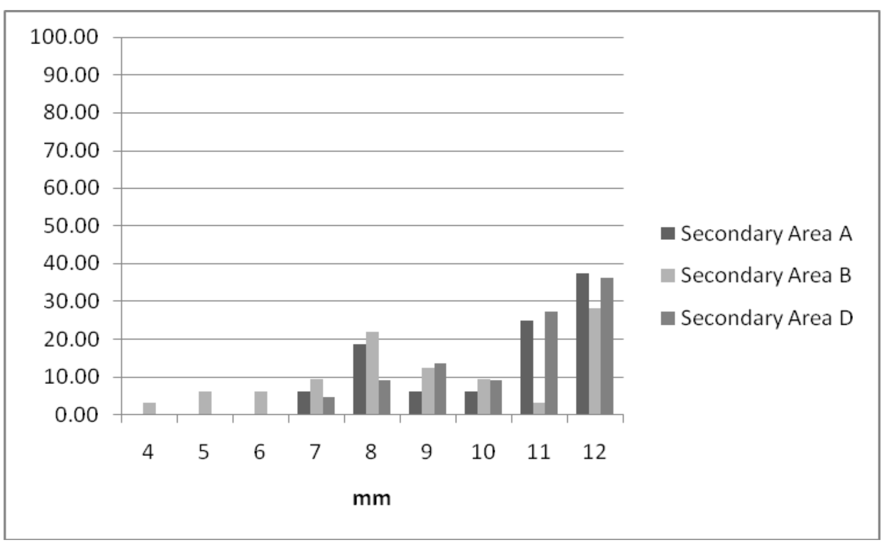
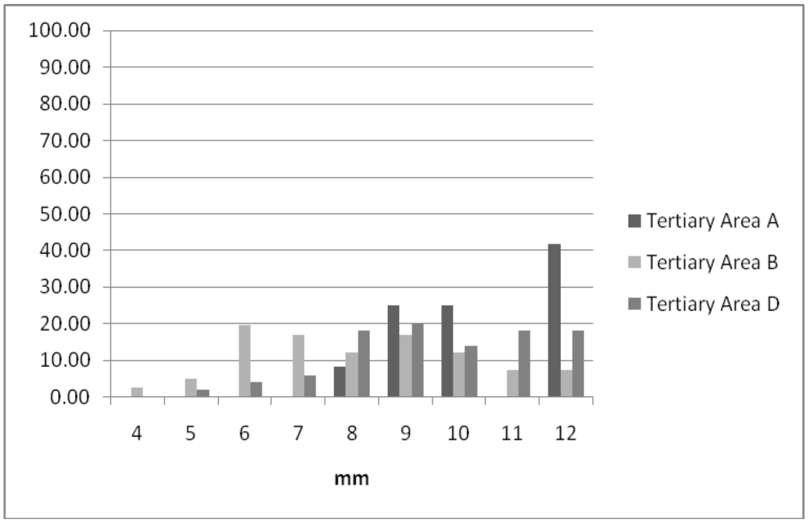
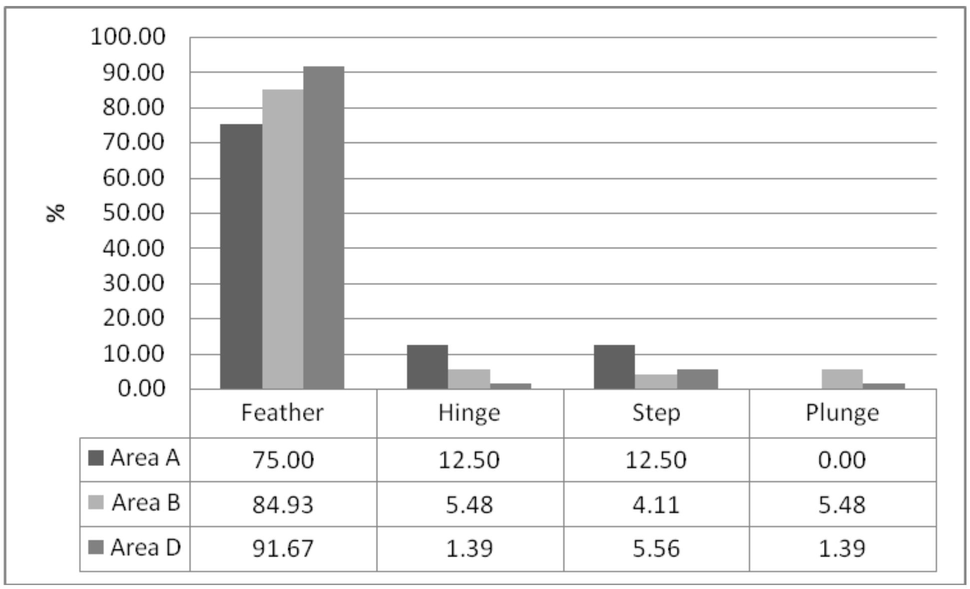


Figure: 8.28: Width frequency distribution of secondary bladelets in Areas A, B and D

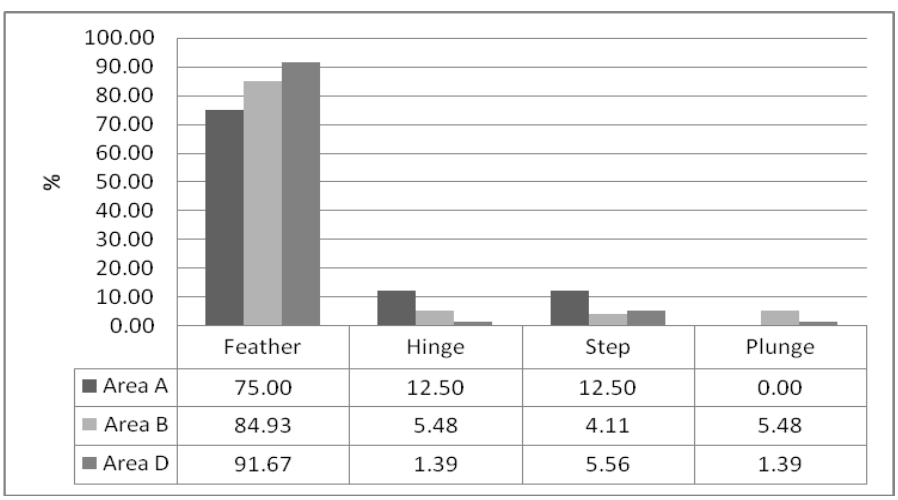


Figures 8.29: Width frequency distribution of tertiary bladelets in Areas A, B and D



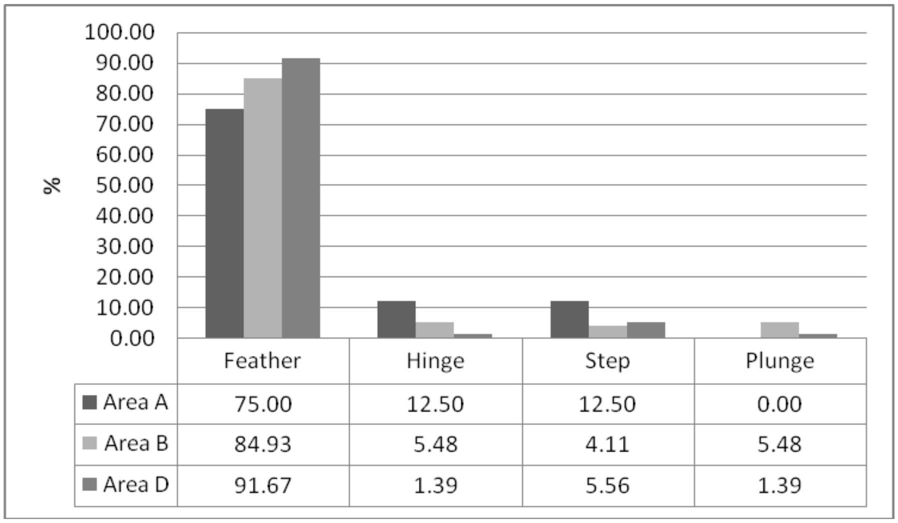
	Feather	Hinge	Step	Plunge
Area A	75.00	12.50	12.50	0.00
Area B	84.93	5.48	4.11	5.48
Area D	91.67	1.39	5.56	1.39

Figure 8.30: Distal terminations of bladelet debitage (Area A: n=16; Area B: n=73, Area D: n=72)



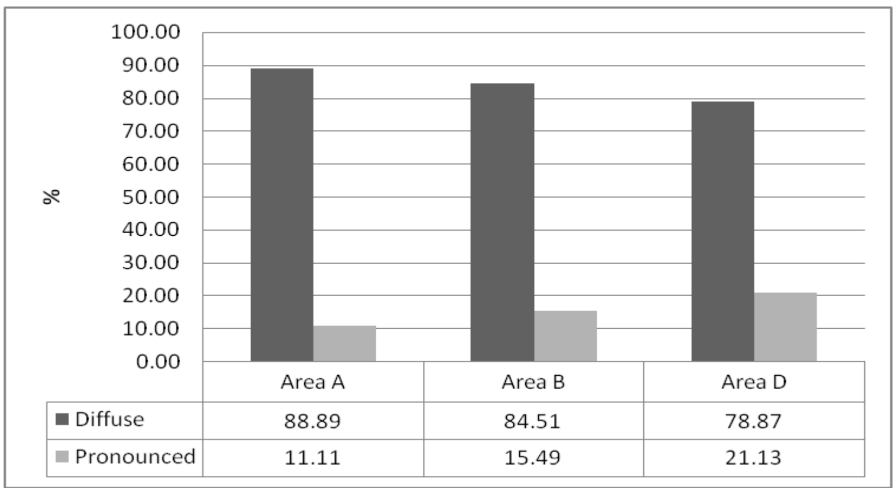
	Feather	Hinge	Step	Plunge
Area A	75.00	12.50	12.50	0.00
Area B	84.93	5.48	4.11	5.48
Area D	91.67	1.39	5.56	1.39

Figure 8.31: Distal terminations of bladelet debitage (Area A: n=16; Area B: n=73, Area D: n=72)



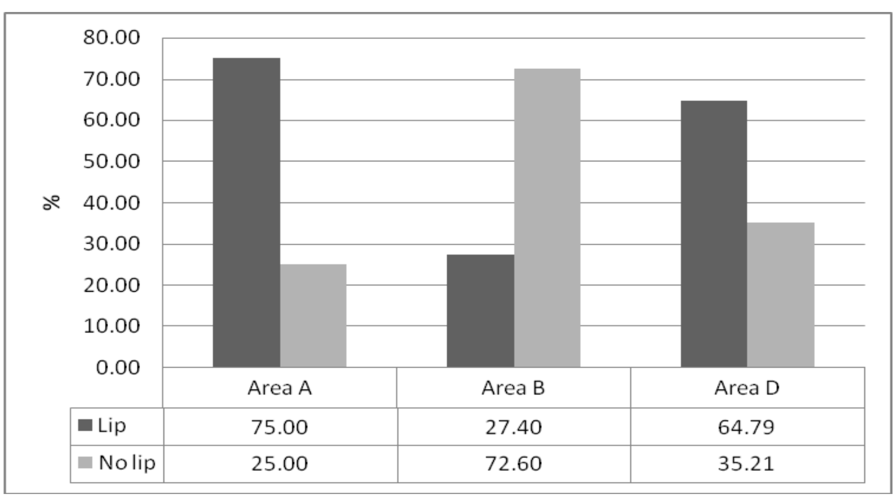
	Feather	Hinge	Step	Plunge
Area A	75.00	12.50	12.50	0.00
Area B	84.93	5.48	4.11	5.48
Area D	91.67	1.39	5.56	1.39

Figure 8.32: Frequency of bladelet platform types (Area A: n=28; Area B: n=72; Area D: n=74)



	Area A	Area B	Area D
Diffuse	88.89	84.51	78.87
Pronounced	11.11	15.49	21.13

Figure 8.33: Prominence of bladelet bulbs of percussion (Area A: n=27; Area B: n=71; Area D: n=71)



	Area A	Area B	Area D
Lip	75.00	27.40	64.79
No lip	25.00	72.60	35.21

Figure 8.34: Presence of lipped versus non-lipped platforms amongst bladelet debitage (Area A: n=28; Area B: n=73; Area D: n=71)

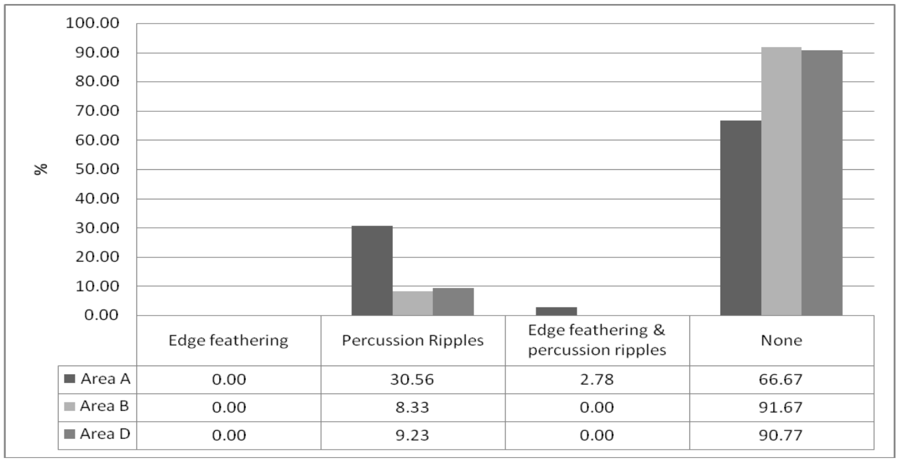


Figure 8.35: Frequency of different types of ventral characteristics amongst bladelet debitage (Area A: n=36; Area B: n=72; Area D: n=65)

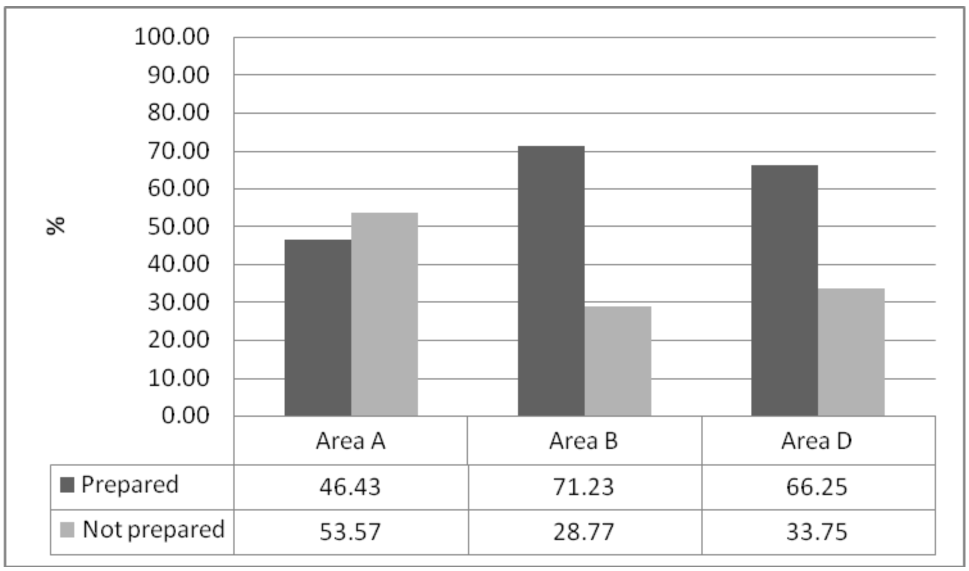


Figure 8.36: Frequency of prepared versus non-prepared platforms amongst bladelet debitage (Area A: n=28; Area B: n=73; Area D: n=80)

	Area A	Area B	Area D
La Mouillah Point	1	2	6
Qalkhan Point	0	0	3
Microburin waste	0	1	81
Total	1	3	90
Microburin index	0.35	0.80	9.20
Restricted microburin index	1.69	2.73	28.21

Table 8.8: Microburin waste products and indexes

	La Mouillah Point	Qalkhan Point	Microburin waste
Distal Scar	6	0	59
Proximal Scar	1	3	22

Table 8.9: Microburin scar orientation of different microburin technique waste products in Area D

the nature of blank production used for the manufacture of non-geometric microliths. There are considerably less distal trihedral points (27.16%) than proximal ones (72.83%; Table 8.9) in Area D. Microburin scars on non-geometric microliths are only rarely observed, as the low number of Qalkhan points and La Mouillah points suggests. This suggests that bladelets sectioned by the microburin technique were usually further retouched over the remnants of the microburin scar.

FLAKE DEBITAGE

Flake debitage forms the most numerically important, but also the most diverse, component of the large debitage at Ayn Qasiyya. Average length and width of flakes indicate that they are generally fairly short, but quite broad (Figure 8.16). In general, secondary flakes are longer than tertiary flakes, while secondary and tertiary flakes are generally longer in Area A. Average width of secondary and tertiary flakes is more uniform across all three areas. Grouped into length and width categories, secondary and tertiary flakes increase within the range of 20-49 mm in length and 10-39 mm in width (Figure 8.37 and 8.38). The Area D sample has a high number of tertiary flakes in the 30-39 mm

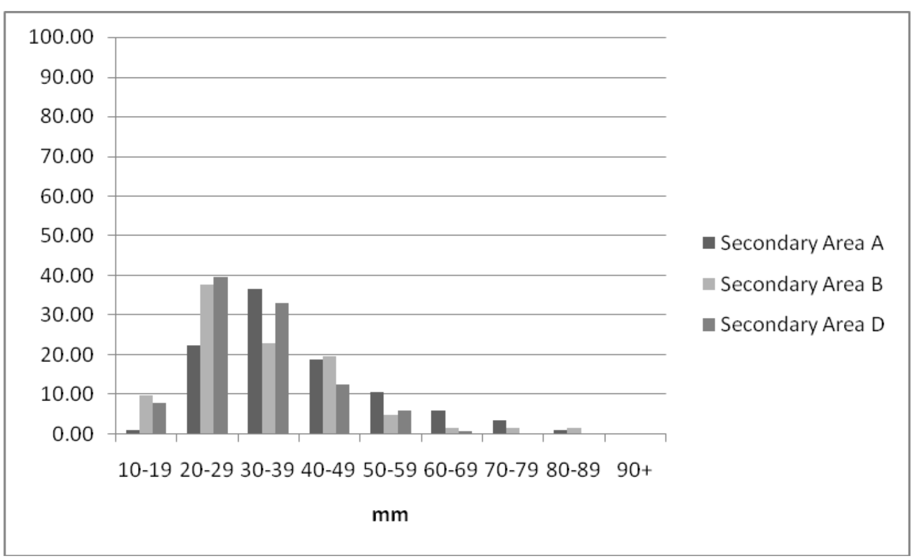


Figure 8.37: Length distribution of secondary flakes (Area A: n=85; Area B: n=61; Area D: n=151)

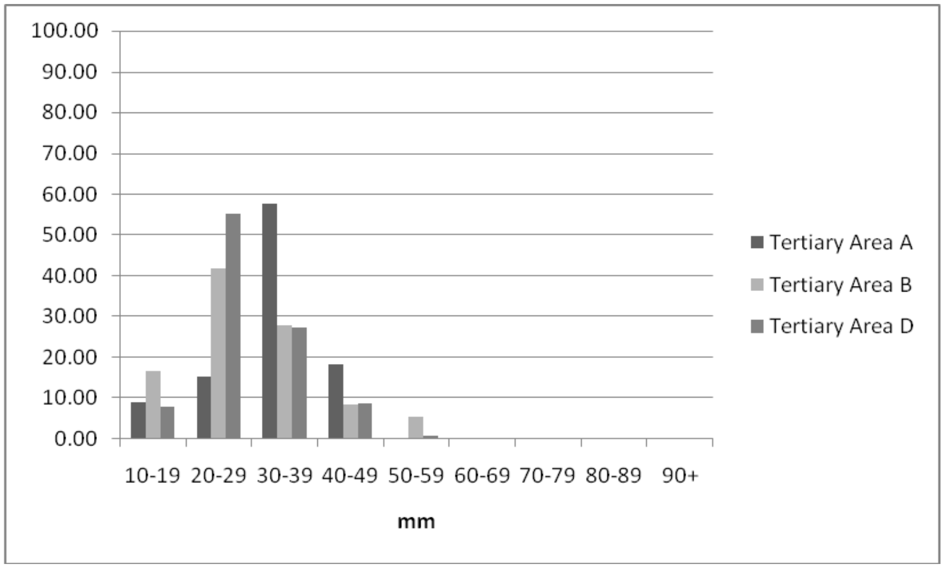


Figure 8.38: Length distribution of tertiary flakes (Area A: n=33; Area B: n=36;

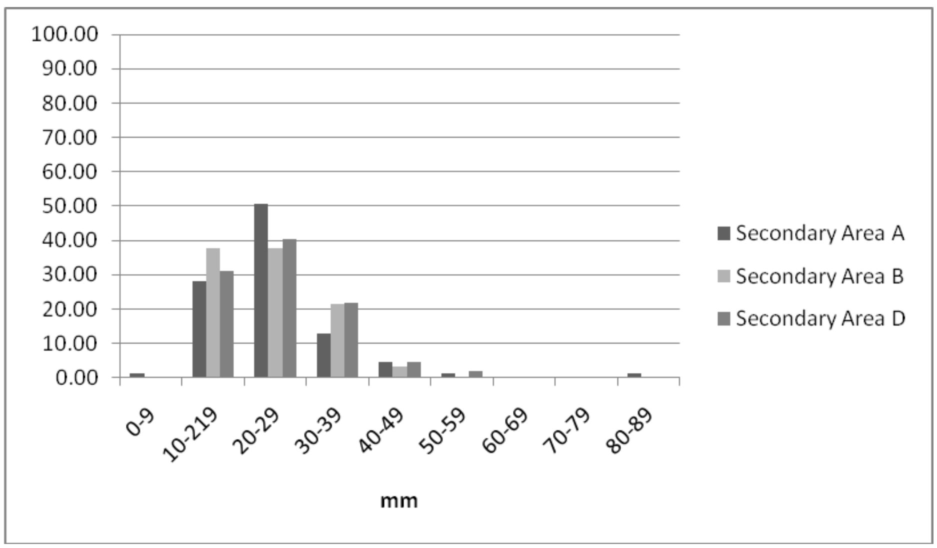


Figure 8.39: Distribution of secondary flake width in cm (Area A: n=85; Area B: n=61; Area D: n=151)

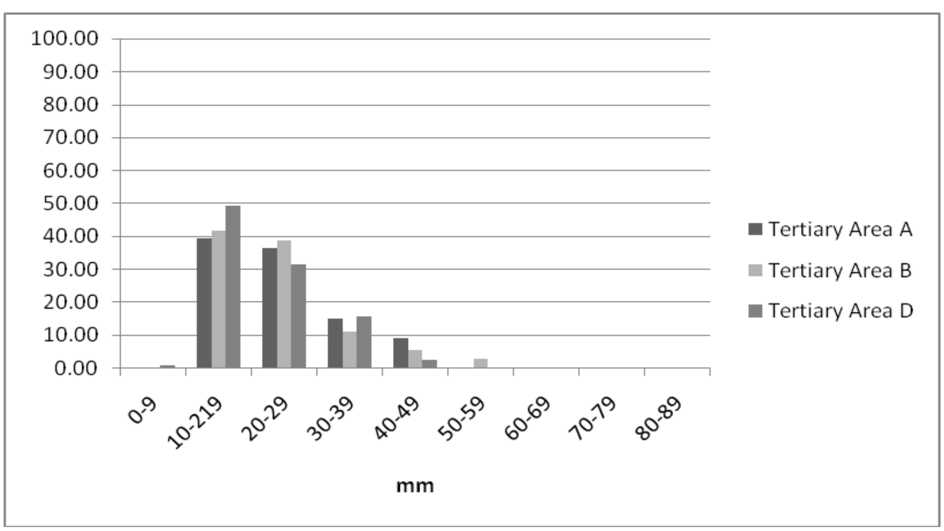
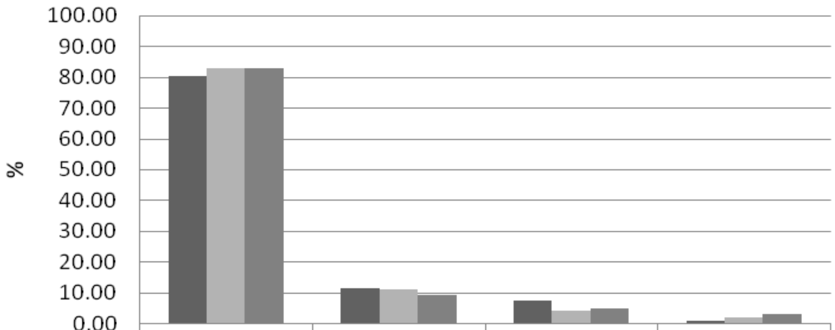
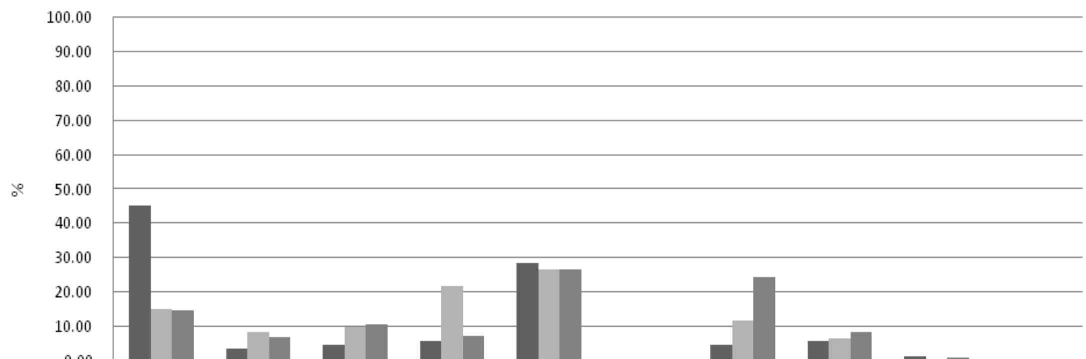


Figure 8.40: Distribution of tertiary flake width in cm (Area A: n=33; Area B: n=36; Area D: n=114)



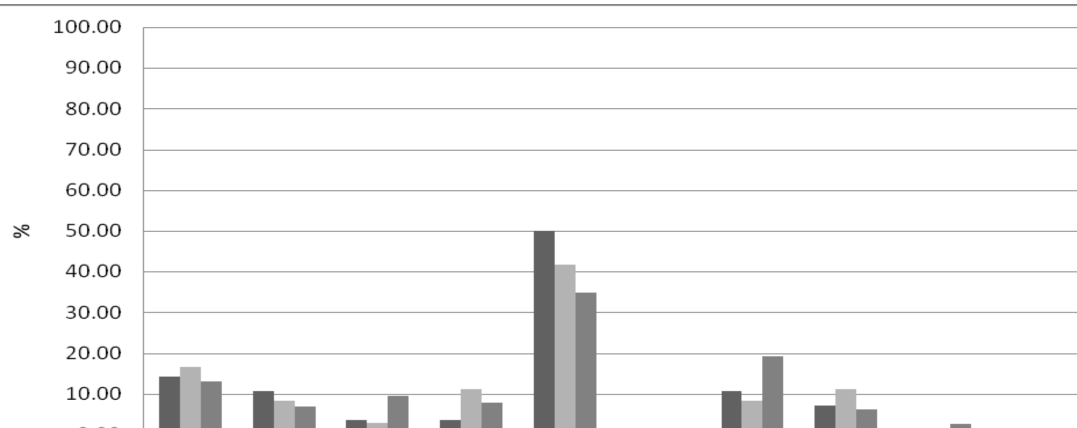
	Feather	Hinge	Step	Plunge
Area A	80.49	11.38	7.32	0.81
Area B	83.00	11.00	4.00	2.00
Area D	83.09	9.19	4.78	2.94

Figure 8.41: Frequency of termination types in secondary and tertiary flake debitage (Area A: n=123; Area B: n=166; Area D: n=272)



	Cortical	Dihedral	Facetted	Punctiform	Flat	Linear	Thin	Winged	Spur	en chapeau de gendarme
Area A	45.24	3.57	4.76	5.95	28.57		4.76	5.95	1.19	
Area B	15.00	8.33	10.00	21.67	26.67		11.67	6.67		
Area D	14.89	6.81	10.64	7.23	26.81		24.26	8.51	0.85	

Figure 8.42: Frequency of platform types amongst secondary flakes (Area A: n=85; Area B: n=61; Area D: n=151)



	Cortical	Dihedral	Facetted	Punctiform	Flat	Linear	Thin	Winged	Spur	en chapeau de gendarme
Area A	14.29	10.71	3.57	3.57	50.00		10.71	7.14		
Area B	16.67	8.33	2.78	11.11	41.67		8.33	11.11		
Area D	13.04	6.96	9.57	7.83	34.78		19.13	6.09	2.61	

Figure 8.43: Frequency of platform types amongst tertiary flakes (Area A: n=28; Area B: n=36; Area D: n=115)

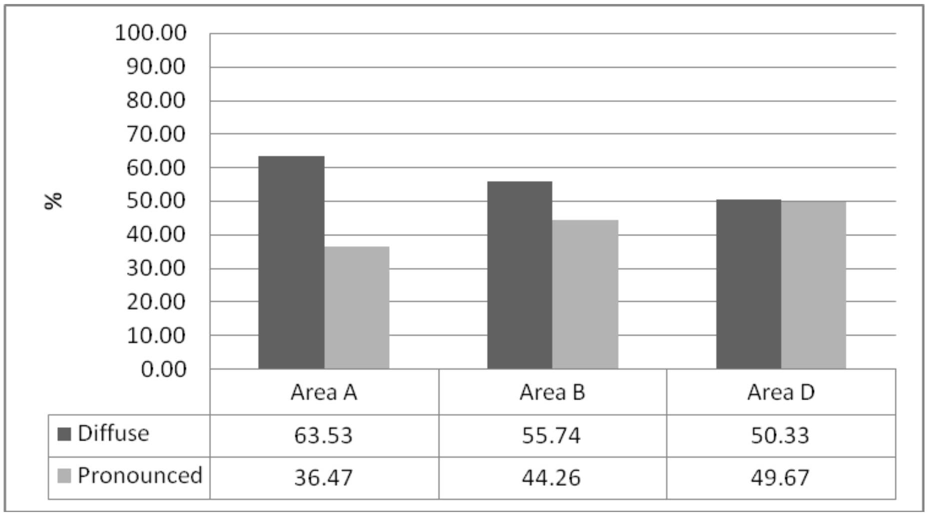


Figure 8.44: Prominence of bulbs of percussion amongst tertiary flakes (Area A: n=33; Area B: n=36; Area D: n=114)

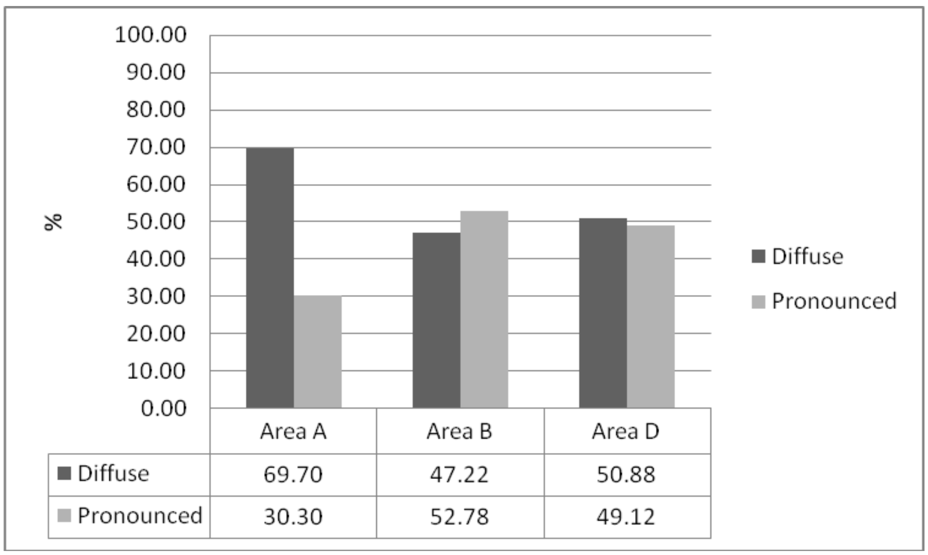


Figure 8.45: Frequency of presence/ absence of platform lips amongst secondary flakes (Area A: n=85; Area B: n=61; Area D: n=151)

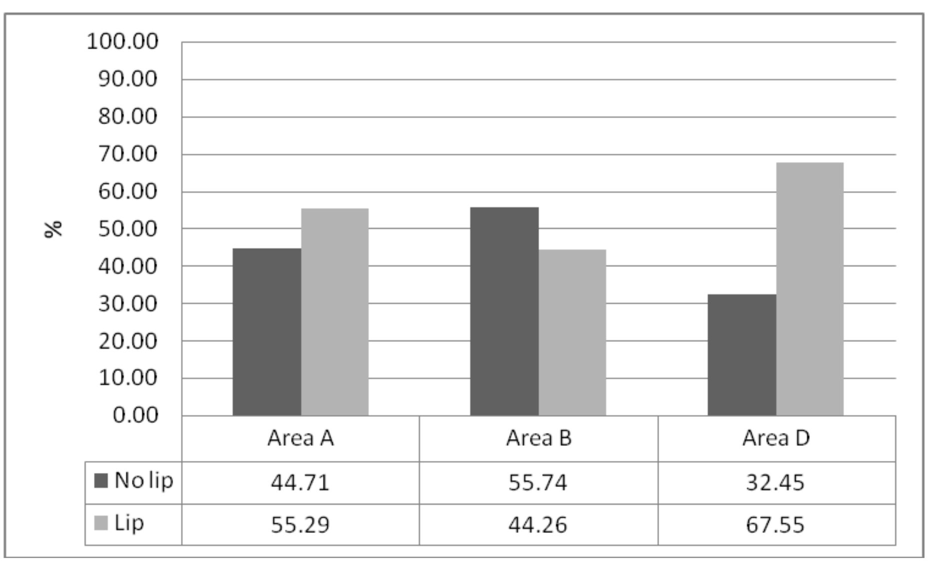


Figure 8.46: Frequency of presence/ absence of platform lips amongst secondary flakes (Area A: n=85; Area B: n=61; Area D: n=151)

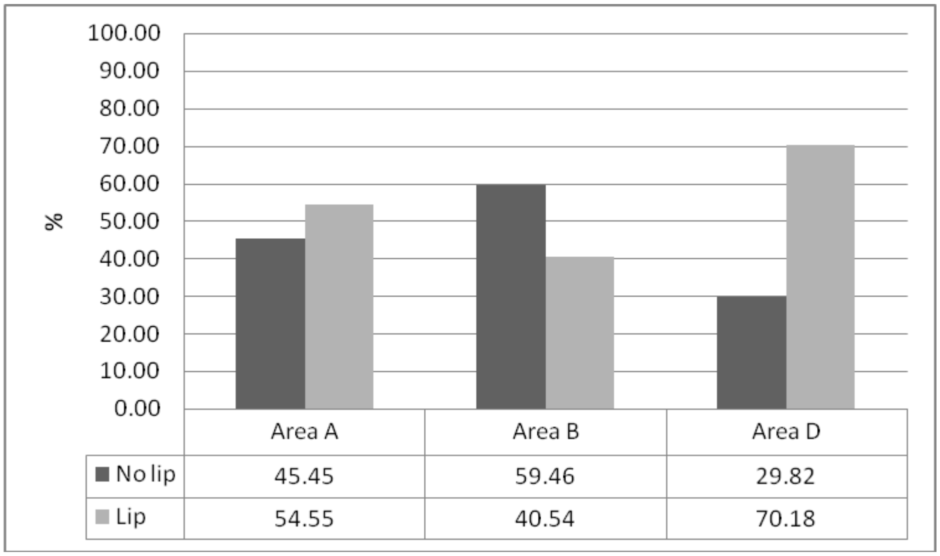


Figure 8.47: Frequency of presence/ absence of platform lips amongst tertiary flakes (Area A: n=33; Area B: n=37; Area D: n=114)

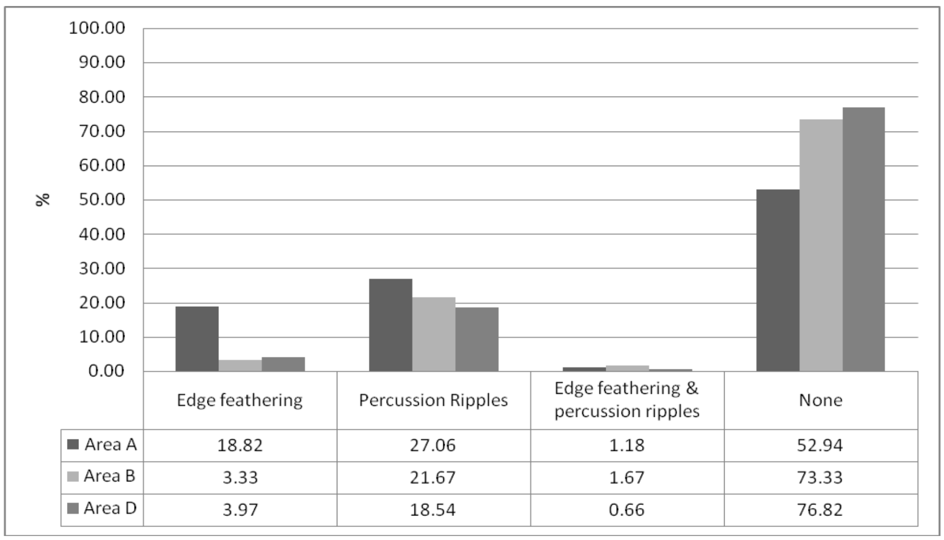


Figure 8.48: Frequency of ventral characteristics on secondary flake debitage (Area A: n=85; Area B: n=60; Area D: n=151)

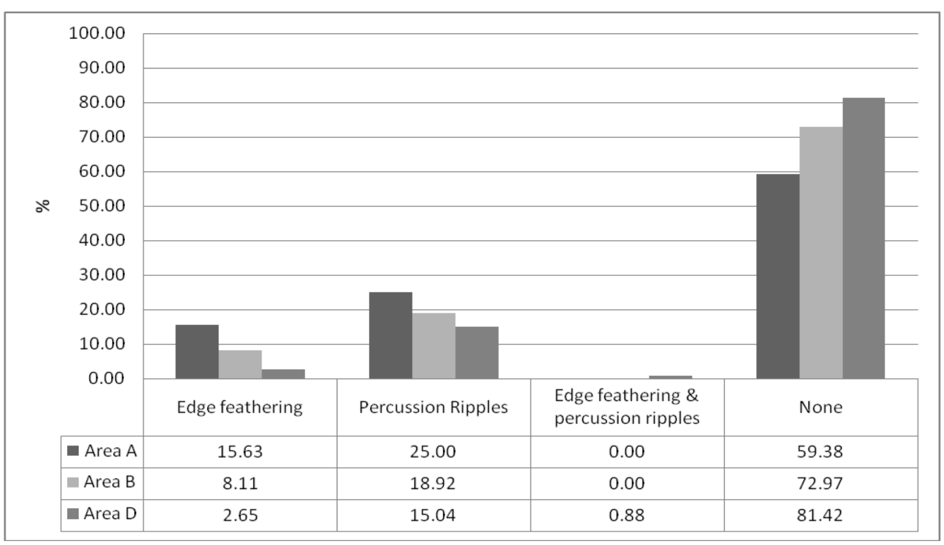


Figure 8.49: Frequency of ventral characteristics on tertiary flake debitage (Area A: n=32; Area B: n=37; Area D: n=113)

length category, while 30-49 mm-long flakes are particularly common in Area A. However, there is no overall clear pattern associated with these distributions, due to the high variability of flake debitage generally (Figures 8.39 and 8.40). Flake terminations are generally feather termination (>80% in each of the three areas, Figure 8.41). A fairly high number of step terminations occur in Area A, while hinge terminations also occur fairly regularly in all three samples. Generally speaking, terminations indicate that knapping mistakes were uncommon (less than 20% of the analysed material).

The analysis of platform types reveals an interesting decrease in the number of cortical platforms in Area A from secondary to tertiary blades, suggesting that platforms were less often de-cortified prior to flake removal (Figure 8.42 and 8.43). There are also a high number of punctiform platforms amongst secondary debitage in Area B, which is not apparent amongst tertiary debitage. Thin platforms are more common amongst secondary and tertiary debitage in Area D. Plain and flat platforms are the most common amongst tertiary debitage, indicating a subtle shift away from cortical, punctiform and thin platforms. This data reinforces trends observed amongst the blade and bladelet debitage. The spike in punctiform platforms in Area B and their decrease amongst tertiary debitage is interesting. This is an interesting difference to the tertiary bladelet debitage, which showed a very high number of punctiform platforms.

Data on bulb characteristics reveals little apparent variation in bulb prominence in either sample (Figure 8.44 and 8.45). Although diffuse bulbs are somewhat more common in Area A, they average around 56% in all samples. Lips on platforms are more informative (Figure 8.46 and 8.47). The Area D sample has a much higher index of lips present than is the case in Areas A and B. Lips are most commonly absent in Area B, while in Area D they occur in 68.68% of secondary and tertiary debitage. The presence of higher numbers of lipped platforms in Area D further indicates subtle differences in hammering techniques between Area B and D as previously discussed (see above). Flake ventral attributes indicate a higher representation of percussion ripples and edge feathering on flakes from Area A (Figure 8.48 and 8.49). This may relate to the pattern of more hinge and steps terminations also being recorded in this sample. Taken together they highlight that the Area A sample may be more prone to knapping errors when compared to Area B and D.

RETOUCHED ARTEFACTS

A total of 1429 secondarily-modified pieces from Areas A, B and D were analysed. As figure 8.50 and table 8.10 show, the vast majority of these are microliths (between 55.18-76.86%), followed by simple retouched pieces. Microliths are most abundant in Area D, while scrapers, simple retouched pieces, and notches/denticulates are more prevalent in Area A. The abundance of microliths in the sample clearly indicates the Epi-palaeolithic character of this assemblage. However, it is important to point out that the majority of microliths are incomplete and discussed in further detail below. Burins are listed in tables 8.10 and 8.11, since they do represent secondarily modified pieces, but as previously discussed, they may not necessarily represents pieces that were used as tools. Instead, some may also be thought of as cores for the production of burin spall bladelets, although the absence of such debitage from the assemblage seems to suggest that this was not a primary function. In the following section, discussion of secondarily modified pieces will be by categories of scrapers, notches/denticulates, burins, other retouched pieces, and microliths.

SCRAPERS

The majority of scrapers are endscrapers, commonly made on blades (Figure 8.51 and 8.52). Almost all display a rounded distal end, characterized by steep or abrupt, and fairly invasive retouch. Blades selected for end scrapers are commonly prismatic with parallel sides and a trapezoidal or rhomboid cross section. Well-proportioned blades were therefore selected for endscrapers, and it seems reasonable to assume that core reduction was, at times, geared specifically toward producing suitable blanks. In rare instances, distal scraper retouch is accompanied by some lateral retouch, which indicates a more versatile use of some pieces. Scrapers with two retouched ends, or double end-scrapers, also occur. Both ends display similarly rounded and invasive retouch. Other scraper types are rarer, which emphasizes the typical blade-based endscraper as a fairly standard early Epipalaeolithic tool type present on numerous sites of the same period in the southern Levant (Bar-Yosef 1970). Their presence in the Ayn Qasiyya assemblage suggests, generally speaking, some type of soft-material processing on the site, such as scraping hides, whittling or scraping wood or bone. Since their overall number is low, it appears that such processing may have played a subordinate role on-site. At the same time, one must not forget that the objects found do not necessarily have to have a one-to-one relationship with past activities. Quite a few of the scrapers are broken, indicating that they were probably removed from handles during repair and replaced by new pieces which did not end up in the present sample. If curation of scrapers was a significant ele-

	Area A	Area B	Area D
Microliths	165	234	598
Burins	13	11	37
Mixed/ multiple		1	2
Scraper	35	30	21
Notches & Denticulates	25	21	25
Truncations	5	4	9
Points	4	2	0
Simple retouched	50	41	78
Utilised	2	4	5
Perforator	0	2	1
Varia	0	2	2
Total	299	352	778

Figure 8.10: Absolute retouched artifacts samples from Ayn Qasiyya

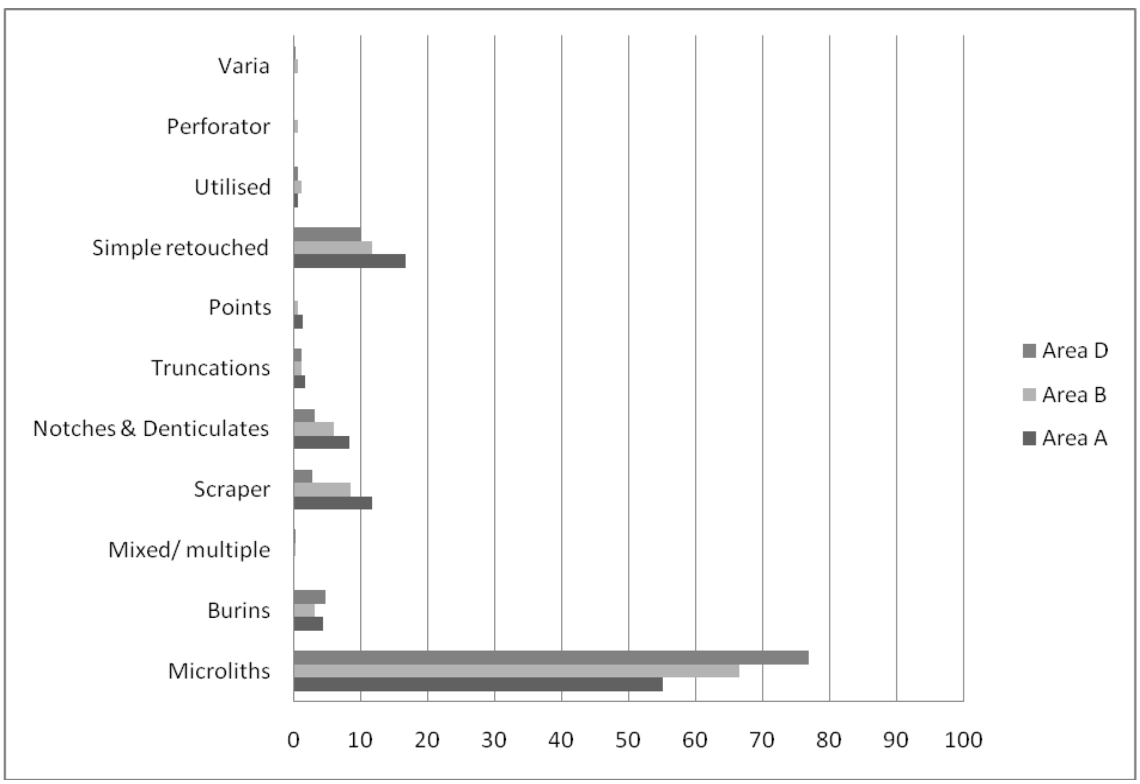


Figure 8.50: Frequencies of major tool groups (for total tumbers see Table 8.10)

		Area A	Area B	Area D
Microliths		**164**	**234**	**598**
	Arch-backed bladelet	2	5	37
	Backed bladelet	2	6	16
	Curved-pointed bladelet	6	6	6
	Double truncated and backed bladelet	2	7	6
	Isosceles triangle	2	1	0
	La Mouillah point	1	2	7
	Micropoint	1	1	1
	Obliquely truncated and backed bladelet	20	23	10
	Obliquely truncated bladelet	0	10	6
	Pointed & backed	3	4	0
	retouched bladelet	6	10	13
	Retouched/ backed bladelet fragment	112	157	485
	Scalene bladelet	7	1	3
	Lunate	0	1	2
	Microgravette point	0	0	2
	Qalkhan points	0	0	3
	Trapeze	0	0	1
Burins		**13**	**11**	**37**
	Dihedral burin	1	2	6
	Burin on break/ natural surface	8	5	22
	multiple burin/ mixed	4	2	3
	Beaked		1	
	Flat faced		1	
	Burin on truncation			4
	Burin transverse on lateral notch			2
Mixed/ multiple			**1**	**2**
	Burin/ scraper		1	2
Scraper		**35**	**30**	**21**
	Circular end-scraper	1	1	2
	Double endscraper	2	6	2
	Endscraper	28	18	15
	Core scraper	1		
	Side scraper	3	4	1
	Thumbnail scraper		1	
	Carinated			1
Notches & Denticulates		**25**	**21**	**25**
	Denticulate	11	3	1
	Notched piece	14	18	24
Truncations		**5**	**4**	**9**
	Double	1	1	
	Single	4	3	9
Falita point		**4**	**2**	
Simple retouched		**50**	**41**	**78**
	Retouched blade	29	15	24
	Retouched flake	21	26	54
Utilised		**2**	**4**	**5**
	Utilised blade	2	4	3
	Utilised bladelet			1
	Utilised flake			1
Perforator			2	1
	Borer		2	
	Awl			1
Chisel			1	
Splintered piece			3	5
Piquant triedre			3	81
Krukowski microburin				2
Varia			1	2
Total		**299**	**358**	**864**

Table 8.11: Specific retouched artifact list of Ayn Qasiyya sample

ment of the technological practice at Ayn Qasiyya many scrapers are simply not represented in the assemblage.

Burins

Burins form an important component of the Ayn Qasiyya assemblage, although they are less numerous than scrapers, notches/denticulates and simple retouched pieces (Figures 8.51 and 8.52). They nevertheless fall into the expected range of burins amongst early Epipalaeolithic assemblages. Natural breaks or surfaces were commonly used as platforms for burin spall removal, especially in Area D. The lack of intensive burin reduction, as exhibited by the low numbers of dihedral and multiple burins, shows that burin spall removal was often a one-off procedure. This may suggest that burins were not produced for extensive use of burin spall blanks, but that they may have been primary tools more often than not. At the same time, negative burin scars that form obtuse angles do not seem to be suitable as working edges. Data accumulated as part of the present study does not permit a judgment on whether burins should be thought of primarily as tools or a type of core.

Notches/Denticulates

Together with truncations and simple retouched pieces, notches/denticulates represent one of the more expedient tool forms in Epipalaeolithic assemblages (Figures 8.51 and 8.52). They are made on both flakes and blades and represent a wide morphological spectrum. The creation of notches or denticulation occurred both by applying fine retouch to create several small retouched notches, as well as by more abrupt retouch creating larger single notches. In all samples they constitute less than 10% of the overall toolkits. Denticulates are commonly associated with cutting or sawing work, with the serrated edge permitting the slicing of harder materials, such as wood, bone or soaked antler. Notches are seen as tools used for whittling or scraping softer materials, including soft woods, so that they can often be understood to be involved in the making of other types of material culture, such as tool handles or hafts for example. Once again, the relative lack of these items from the tool kit can be taken as a probable indicator for the probable lack of processing activity at the site. While some work did occur, organic material culture was not commonly manufactured at the site.

TRUNCATIONS

Truncated pieces are not common in the Ayn Qasiyya samples and together with notches/denticulates and simple retouched pieces, form part of a more generic and expedient group of chipped stone tools. Single truncations are more common in all three samples, with double truncations being especially rare. Their uses were likely multiple and included cutting, sawing and whittling soft materials.

SIMPLE RETOUCHED PIECES

This group is perhaps the most expedient form of tools in the samples, and although by far less, represent the second most common tool group after the microliths. In the Area D sample, retouched flakes are particularly numerous, but the distribution is more even in Areas A and B. Both blades and flakes were retouched with no clear pattern as to retouch location, type or intensity. Fine, abrupt, alternate and invasive retouch occurs and is usually, but not exclusively, located on either the left or right edges of the piece. The variability in this group reflects the variable uses to which these tools were put. A large number were likely used in everyday activities, such as butchering game, cutting plants, wood or hide. The majority are highly like to have been used as part of processing softer materials, since many working edges are fairly delicate. The relative prominence of these tools amongst the macro-lithic chipped stone artefacts indicates a reasonable degree of residential activity at the site, although a majority of this is likely to have been immediate actions relating to hunting or otherwise exploiting the local environment. An allied group of tools are the utilized pieces, which were identified on the basis of minute traces of edge damage visible to the naked eye. These are rare at the site, although such wear traces can be easily missed as part of the sorting of a large assemblage. It is likely that a fair number of debitage items contain difficult to see or microscopic edge damage relating to use, which have not been recognized as part of the present analysis.

PERFORATORS

Borers and awls are restricted to just three examples. These were at times heavily retouched by abrupt direct and inverse retouched to shape a robust, thick and pointed business end. Their rarity at the site reinforces the view that more residential activities were not commonly carried out at the site.

FALITA POINTS

Falita points were first characterized by Rust (Rust 1950) following his excavations at

Yabrud rockshelter in Syria. He identified them as one of the characteristic tools of his Falitian cultural phase, which has since fallen out of use (Olszewski 2006). Falitian points occur in some Kebaran assemblages, such as Ein Gev I (Bar Yosef 1970). At Ayn Qasiyya they only occur within Areas A and B, where they are very nicely executed. Indeed, some are made on flint that is dissimilar to the general raw material used in these assemblages, which may indicate that they were acquired through exchange or other means.

MICROLITHS

Microliths represent by far the largest group of retouched chipped stone from the site, keeping clearly in line with other Epipalaeolithic assemblages (Table 8.10 and 8.11; Figure 8.53). In all three samples discussed here the vast majority of microliths are broken or incomplete, which poses some difficulty for interpreting the samples as a whole. In many cases, analysts of Epipalaeolithic assemblages have opted to assign broken and incomplete microliths to a typological class on the basis of a hunch as to which tool type they belong to. Here I have opted to group all broken microliths together rather than assign them to a type. Instead, attribute data will be used to characterize the broken microliths with regards to their potential typological assignation. This point is crucial, since there appear to be important differences between the Area A/B and Area D assemblages (Figure 8.53, 8.54, 8.55). While the technological differences have already been alluded to above, they will be the focus of the remainder of this section.

The majority of complete microliths are non-geometric, except a few isolated lunates and isosceles triangles. While the majority of microliths, such as curved pointed bladelets, double truncated and backed bladelets, micropoints and pointed and backed bladelets, occur in moderate frequencies in all three samples, significant differences exist in the arched backed bladelet and obliquely truncated and backed bladelet classes (Figure 8.53; Table 8.11). Obliquely truncated and backed bladelets are particularly common in Area A and B, while arched backed bladelets dominate the complete microlithic tool group in Area D. This tendency is further accentuated when the backed bladelet fragments are considered. This subtle difference between the typological characterization of the samples from Area A, B and D is a recognized pattern that differentiates the Kebaran lithic industry from the Nebekian. Although there is some uncertainty over the applicability of this subdivision (Hovers 1991), early Epipalaeolithic assemblages dominated by obliquely truncated and backed bladelets have been associated with Group C or the later phase of the Kebaran industry. The radiocarbon dates obtained from Ayn Qasiyya (see chapter 6) also confirms this techno-typological identification of the Area A/B material.

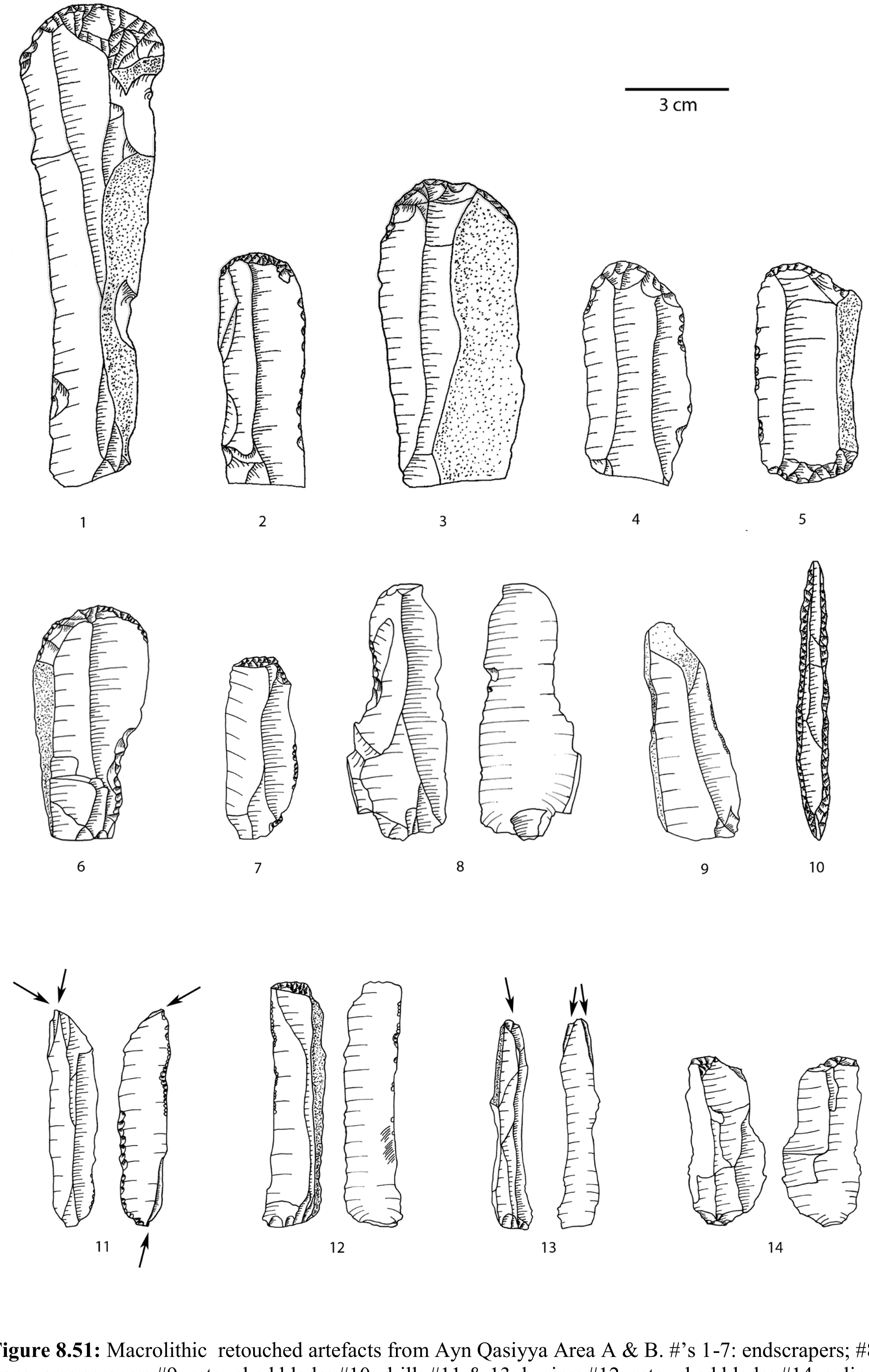


Figure 8.51: Macrolithic retouched artefacts from Ayn Qasiyya Area A & B. #'s 1-7: endscrapers; #8: transverse scraper; #9: retouched blade; #10: drill; #11 & 13: burins; #12: retouched blade; #14: splintered piece.

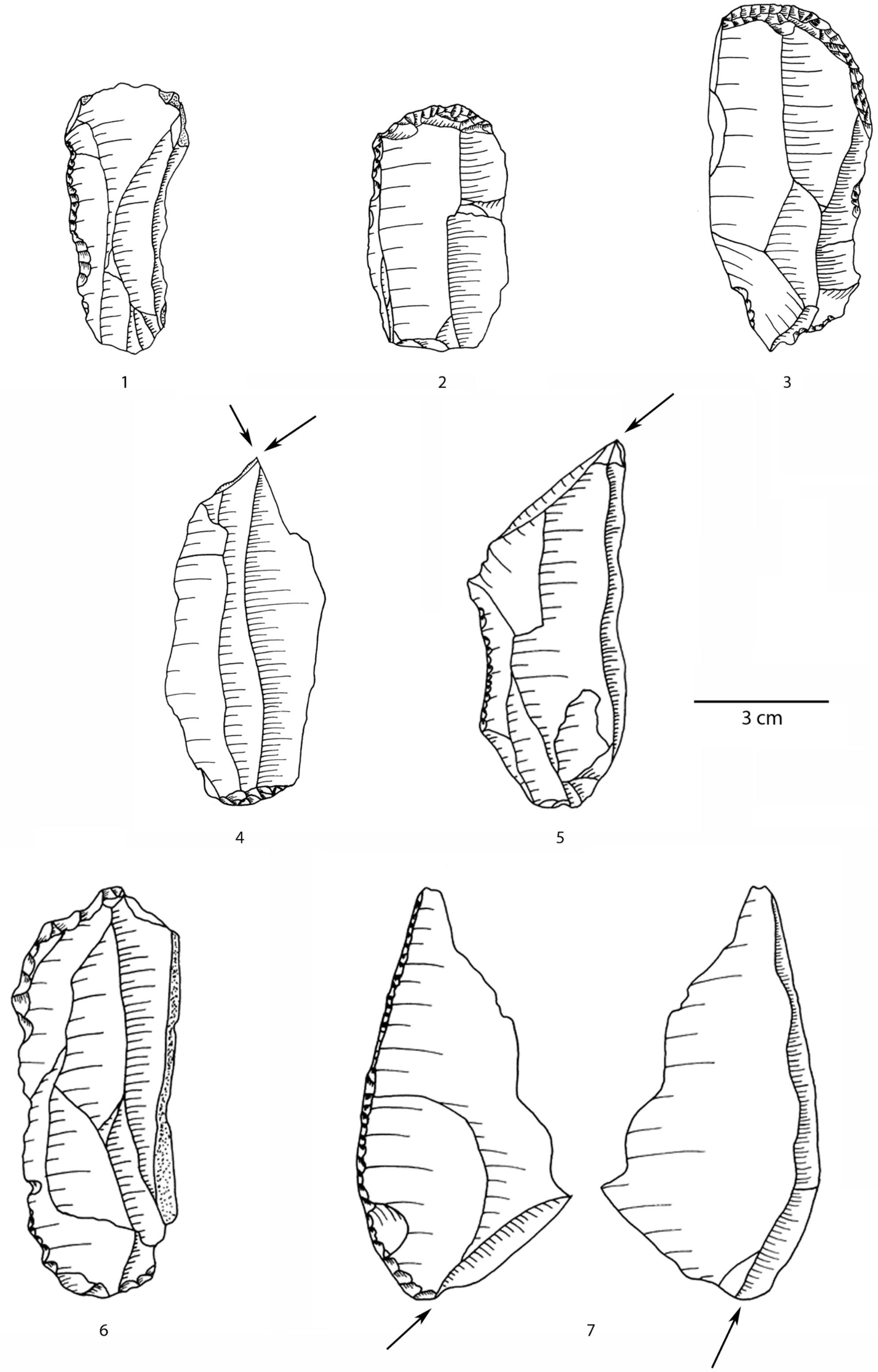


Figure 8.52: Macrolithic retouched pieces from Ayn Qasiyya Area D. #1 transverse scraper; #'s 2-3: endscrapers; #'s 4, 5 & 7: burins; #6: nosed endscraper.

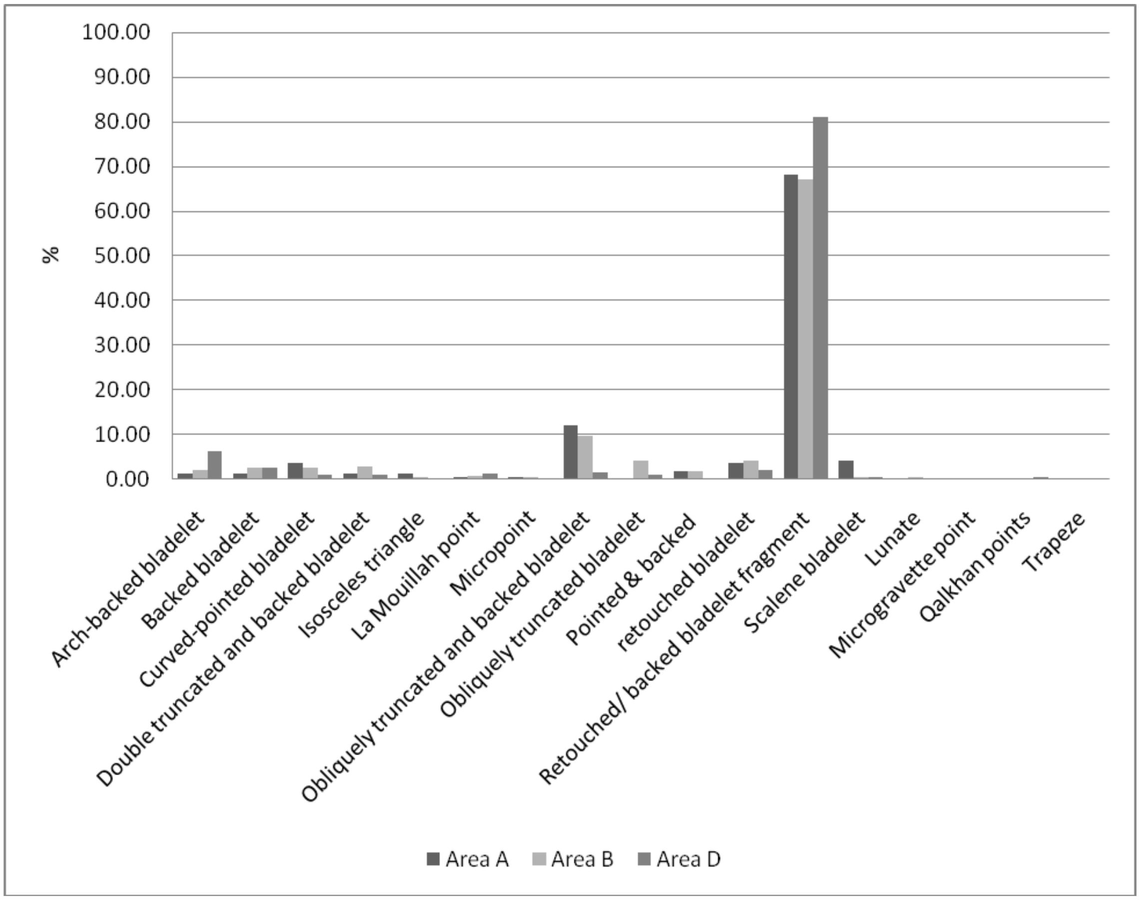


Figure 8.53: Percentile representation of microliths at Ayn Qasiyya

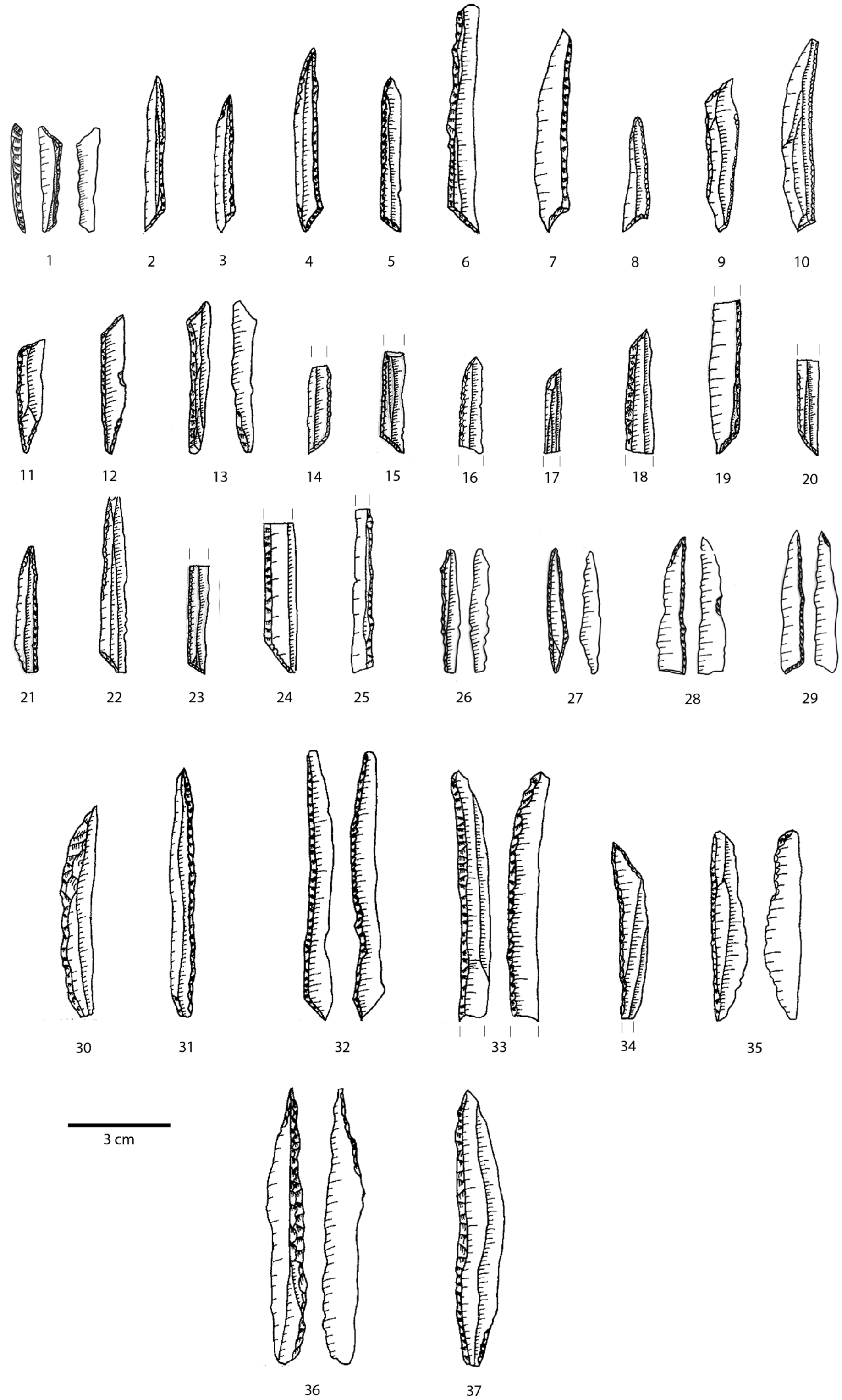


Figure 8.54: Microliths from Ayn Qasiyya Area A/B. #'s1-13, 26-29, 32, 35: obliquely truncated and backed bladelets. #'s 14-25, 33-34: broken microliths. #30: curved-pointed bladelet. #31: backed and pointd bladelet. #36-37: Falita points

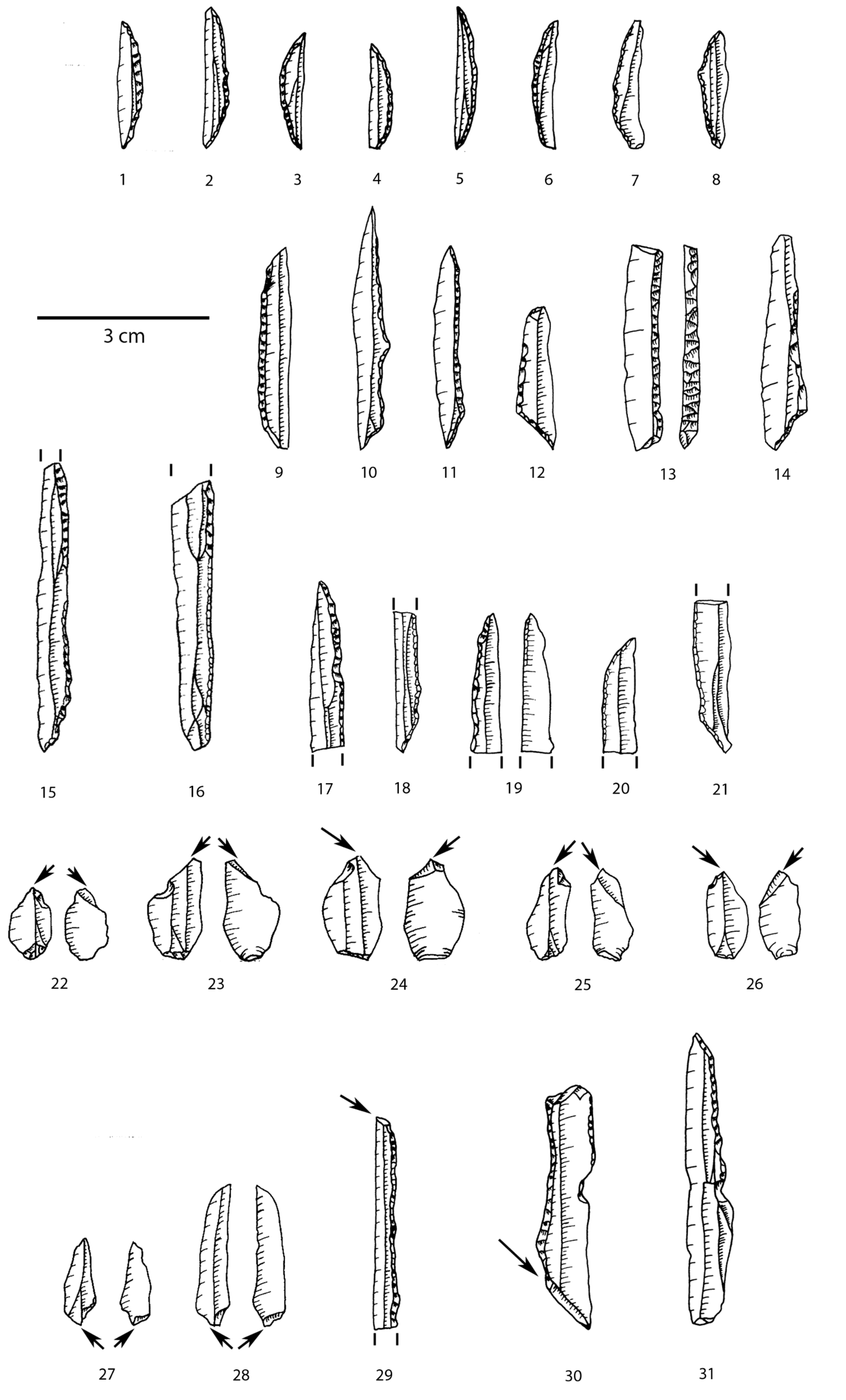


Figure 8.55: Microliths from Ayn Qasiyya Area D. #'s 1-8: arched-backed bladelets. #'s 9-12, 14: obliquely truncated and backed bladelets. #13 & 29: La Mouillah point. #'215-21: broken microliths. #'s: 22-28: piquant triedre. #30: Qalkhan point. #31: unfinished partially backed piece with medial notch

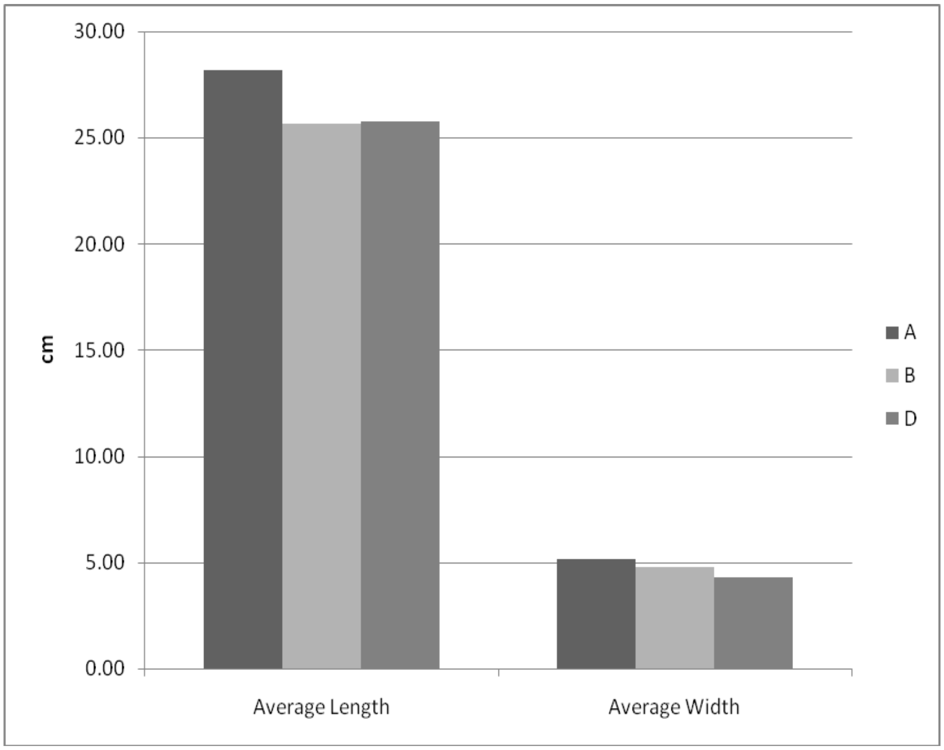


Figure 8.56: Average length and width of obliquely truncated and backed bladelets in Areas A and B and arch-backed bladelets in Area D

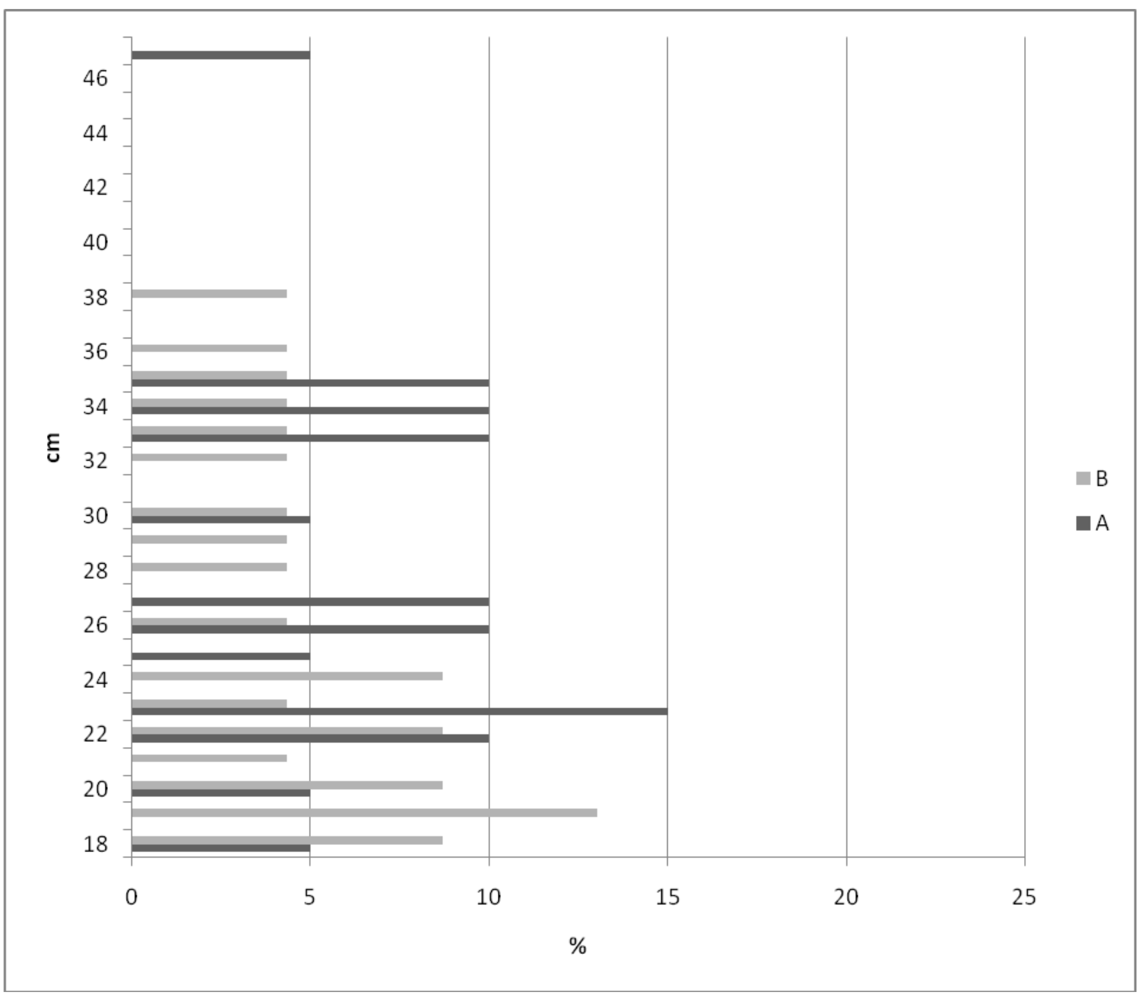


Figure 8.57: Length frequency of obliquely-truncated and backed bladelet in Areas A and B

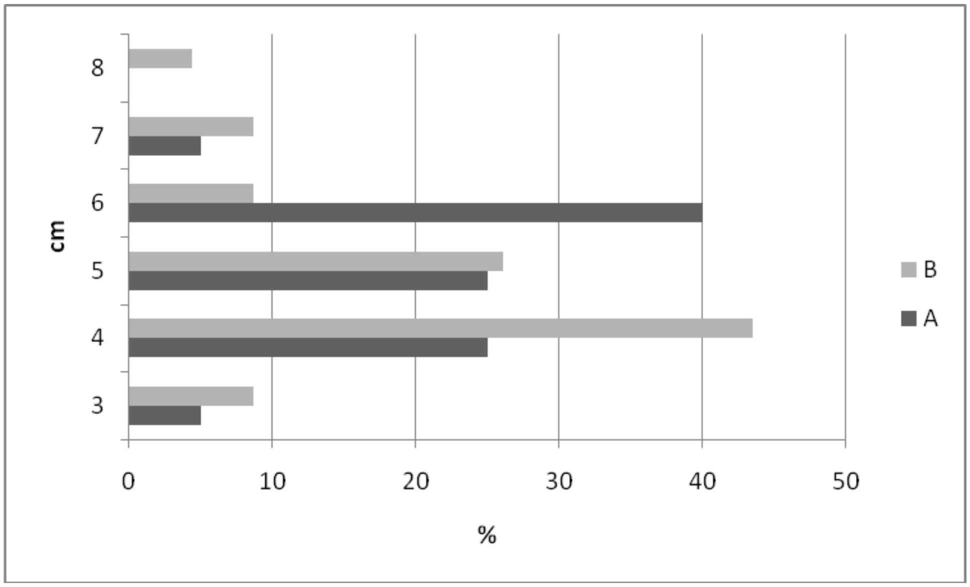


Figure 8.58: Width frequency of obliquely truncated and backed bladelets in Areas A and B

Abundant arched backed bladelets, paired up with the use of the microburin technique (see above), has on the other served as an identifying factor of the Nebekian industry (Byrd 1998; Goring-Morris 1995; Goring-Morris & Belfer-Cohen 1998; Henry 1995; Olszewski 2001b, 2006). The vast majority of the microliths from Ayn Qasiyya are, however, broken or fragmentary pieces. A detailed consideration of their characteristics and attributes is therefore necessary to discuss the range of variability between the Area A/B and Area D samples.

Obliquely truncated and backed bladelets are the most abundant complete microlith in Area A and B (20 and 23 pieces respectively). These are generally slender, narrow pieces with an oblique flat or oblique concave truncation located either distally or proximally (Figures 8.56, 8.57 and 8.58). The Area A obliquely truncated and backed bladelets tend to be somewhat longer on average than the Area B ones, and they also tend to be somewhat wider. However, these differences are minute and negligible. In the majority of cases truncations are located distally (Table 8.12), although there are a number of cases where the oblique truncation has been positioned at the proximal end. In the latter cases it is common to find that the distal part was fashioned into a point by applying fine, bilateral retouch. This may suggest that they were used as piercing tools, likely for projectile use. In Area A the majority of the backing was positioned on the left lateral part of the bladelet, whereas in Area B there is a more even spread between left and right (Table 8.13). The majority of backing retouch is straight, running parallel to the opposite edge and giving the impression of a very regular piece (Table 8.14). In some instances this straight backing is, however, not parallel to the opposite edge. The presence of a low fre-

	Truncation Distal	Truncation Proximal
A	13 (61.9%)	8 (38.1%)
B	15 (65.2%)	8 (34.8%)

Table 8.12: Location of truncations on obliquely-truncated and backed bladelets in Areas A and B.

	Left Lateral	Right Lateral
A	14 (70%)	6 (30%)
B	11 (47.8%)	12 (52.8%)

Table 8.13: Location of backing on obliquely truncated and backed bladelets in Area A and B.

	Straight and parallel to opposite edge	Straight, not parallel	Concave	Convex	Arched to point
A	9 (47.4%)	5 (26.3%)	2 (10.5%)	2 (10.5%)	1 (5.3%)
B	12 (54.5%)	5 (22.7%)	2 (9.1%)	2 (9.1%)	1 (4.5%)

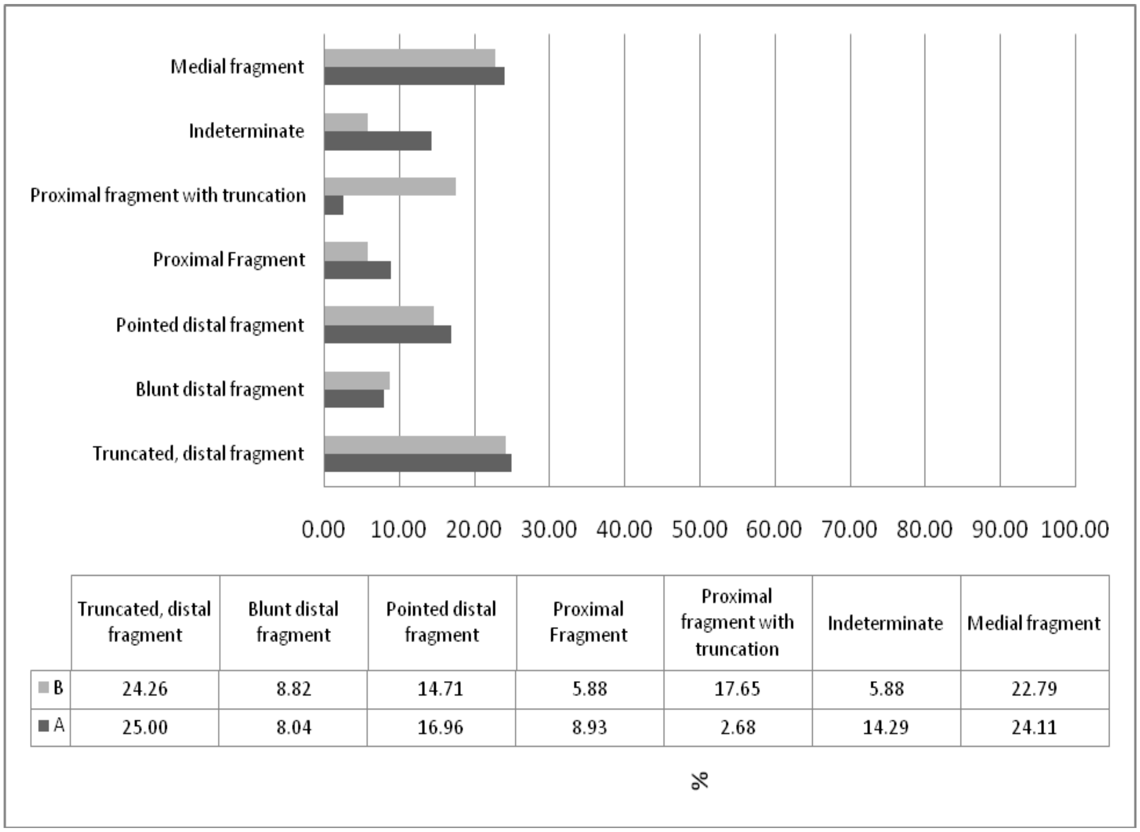
Table 8.14: Location of backing on obliquely truncated and backed bladelets from Area A & B.

	Abrupt exterior	Semi-steep exterior	Bipolar	Fine exterior
A	13 (65%)	5 (25%)	2 (10%)	0 (0.0%)
B	11 (64.7%)	2 (11.8%)	1 (5.9%)	3 (17.6%)

Table 8.15: Type of backing on obliquely truncated and backed bladelets in Area A & B.

	A	B	A	B
Truncated, distal fragment	28	33	25.00%	24.26%
Blunt distal fragment	9	12	8.04%	8.82%
Pointed distal fragment	19	20	16.96%	14.71%
Proximal Fragment	10	8	8.93%	5.88%
Proximal fragment with truncation	3	24	2.68%	17.65%
Indeterminate	16	8	14.29%	5.88%
Medial fragment	27	31	24.11%	22.79%
Totals	112	136	100.00%	100.00%

Table 8.16: Absolute numbers of fragmentary microliths in Areas A and B by type.



	Truncated, distal fragment	Blunt distal fragment	Pointed distal fragment	Proximal Fragment	Proximal fragment with truncation	Indeterminate	Medial fragment
B	24.26	8.82	14.71	5.88	17.65	5.88	22.79
A	25.00	8.04	16.96	8.93	2.68	14.29	24.11

Figure 8.59: Frequency of broken microlith types in Areas A and B

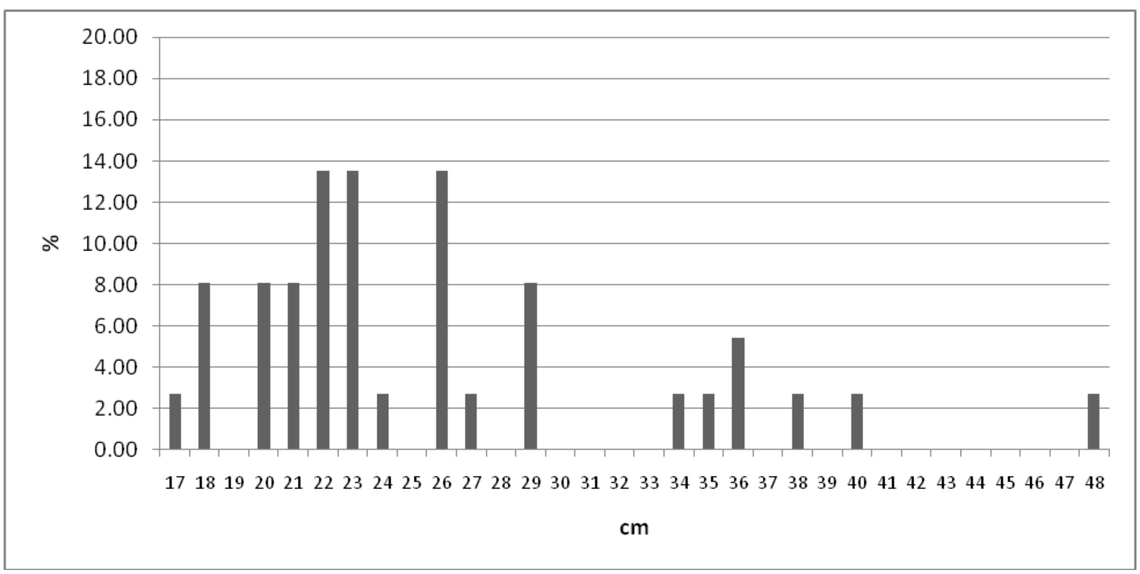


Figure 8.60: Length frequency of arch-backed bladelets in Area D

quency of convex, concave and arched shapes also indicates that there is some variability within this tool class with regards to overall shape. The mode of retouch varies from a dominant abrupt retouch, to include rarer occurrences of semi-abrupt, bipolar and fine retouch (Table 8.15). Again, this shows that while there is overall conformity, some variation does occur.

112 pieces from Area A and 157 pieces from Area B were recorded as broken or fragmentary bladelets (Table 8.11). Both medial fragments broken distally and proximally, and distal fragments with truncations are common (Figure 8.59; Table 8.16). After indeterminate fragments, which could often not be further identified due to being too fragmentary or burnt, distal fragments with a pointed end form the third most common group. Proximal fragments with truncations are particularly common in Area B, while proximal fragments and blunt distal fragments represent the remaining pieces. Distal fragments with truncations are often preserved in sufficient length to assume that they likely fall into the oblique truncated and backed category, although it is equally possible that they were double truncated and backed pieces. The same applies to proximal fragments with truncation, which could also fall into either group, but often seem more likely to have been obliquely truncated and backed bladelets. Other aspects that can be discussed on the basis of fragmentary microliths are the location, shape and mode of retouch of the backed part of the microliths, where applicable. The location of retouch (Table 8.17) shows an even distribution in both areas between left and right edges. The shape of the backed edge is once again predominately straight, and parallel to the working edge (Table 8.18). This emphasizes the similarity to the shape found amongst the obliquely truncated and backed bladelets. Other shapes are represented in lower numbers. An increase in the number of arched backed shapes was observed in Area B. Fragments displaying such a shape certainly cannot be straightforwardly interpreted as belonging to the arched backed bladelets, since curved pointed bladelets also occur in the sample. The mode of retouch once again shows the clear abundance of abrupt backing retouched, although there is a higher number of bipolar retouched amongst the fragments when compared to the obliquely truncated and backed bladelets (Table 8.19).

In Area D arched backed bladelets form the most abundant group of complete microliths in the sample (Figures 8.53 and 8.54). These are comparable in size to the obliquely truncated and backed bladelets in Area B, being generally very narrow and short (Figure 8.56 and 8.60). There is a clear clustering within the 4 mm width group, which may suggest that this was a preferred width (Figure 8.61). Backing is evenly distributed amongst left and right lateral positions, while the majority of pieces are backed by abrupt retouch (Table 8.20 and 8.21). Arched backed bladelets in Area D appear very

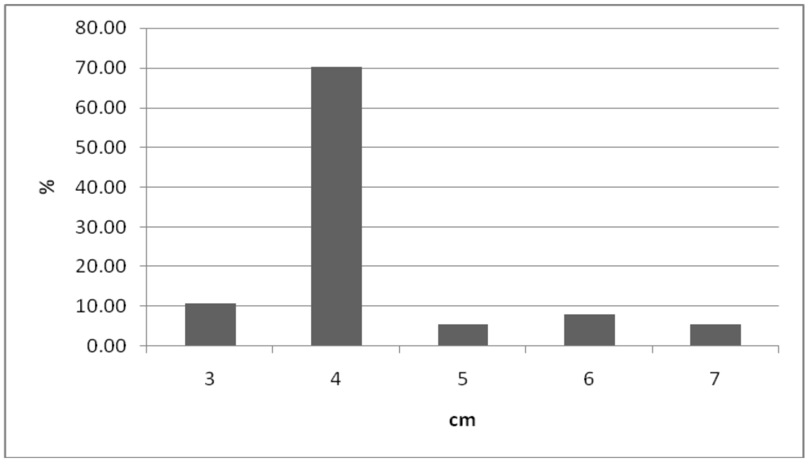


Figure 8.61: Width frequency of arch-backed bladelets in Area D

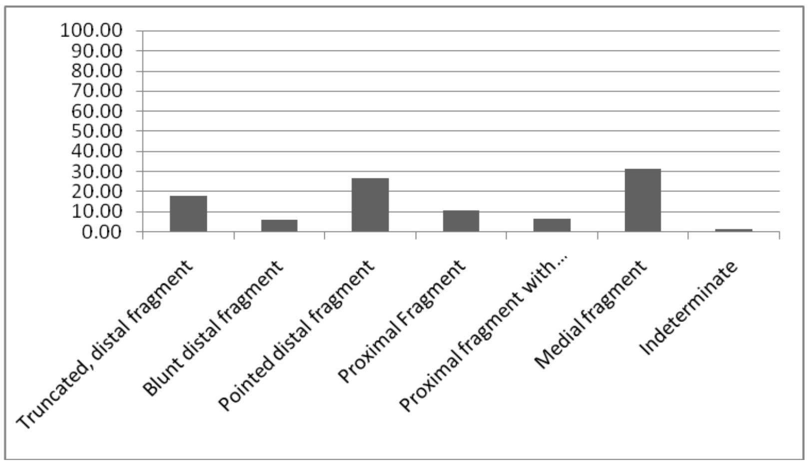


Figure 8.62: Frequency of fragmentary bladelet types in Area D

	Left Lateral	Right Lateral
A	52 (51%)	50 (49%)
B	58 (48.7%)	61 (51.3%)

Table 8.17: Location of backing on fragmentary microliths from Area A and B

	Straight and parallel to opposite edge	Straight, not parallel	Concave	Convex	Arched to point	Shouldered
A	59 (59%)	23 (23%)	4 (4%)	8 (8%)	4 (4%)	2 (2%)
B	70 (58.3%)	22 (18.3%)	6 (5%)	6 (5%)	14 (11.7%)	2 (1.7%)

Table 8.18: Shape of backed edge on fragmentary microliths from Area A and B

	Abrupt exterior	Semi-steep exterior	Bipolar	Fine exterior	Semisteep interior	Abrupt interior
A	73 (66/4%)	9 (8.2%)	27 (24.5%)	1 (0.9%)	0 (0.0%)	0 (0.0%)
B	90 (81.8%)	4 (3.6%)	19 (17.3)	1 (0.9%)	1 (0.9%)	2 (1.8%)

Table 8.19: Type of backing retouch on fragmentary microliths from Areas A and B.

Left Lateral	Right Lateral
17 (45.9%)	20 (54.1%)

Table 8.20: Location of backing on arch-backed bladelets from Area D

Abrupt exterior	Fine exterior
35 (94.6%)	2 (5.4%)

Table 8.21: Mode of backing on arched-backed bladelets from Area D

Microburin scar	4 (4.6%)
Retouched truncation	83 (95.)4%

Table 8.22: Type of truncation amongst truncated microlith fragments in Area D

Left Lateral	Right Lateral
232 (49.9%)	233 (50.1%)

Figure 8.23: Location of backing on fragmentary microliths from Area D

Straight and parallel to opposite edge	Straight, not parallel	Concave	Convex	Arched to point	Shouldered	Irregular
203 (46.3%)	48 (11.0%)	24 (5.5%)	41 (9.4%)	98 (22.4%)	3 (0.7%)	21 (4.8)

Table 8.24: Shape of backed edge amongst fragmentary microliths in Area D

Abrupt exterior	Semi-steep exterior	Bipolar	Fine exterior
316 (71.3%)	21 (4.7%)	27 (6.1%)	79 (17.8%)

Table 8.25: Mode of backing amongst fragmentary bladelets in Area D

standardized and are well executed. In terms of their shape they form a distinct contrast to the obliquely truncated and backed bladelets found in the Areas A and B sample. Amongst the fragmentary and broken microliths in Area D medial fragments are most abundant, closely followed by distal, pointed fragments (Figure 8.62). Distal fragment with truncation are the third most common group, followed by proximal fragments, truncated proximal fragments and blunt, distal fragments and indeterminate fragments. This shows the relative importance of pointed elements amongst the fragmentary microliths, which are often sufficiently well -preserved to suggest that they were probably broken arched backed bladelets. In a few cases, however, they may also grade into the curved pointed and backed bladelet group. Distal truncated fragments can be expected to fall into the group of obliquely truncated and backed bladelets in the majority of cases, although many fragments and complete pieces amongst the curved point and backed bladelets show convex backing that places them closer to the curved pointed and backed bladelets. Only four of the distal fragments with truncation show microburin scars, while the other show various kinds of truncation retouch (Table 8.22). Once again, backing is evenly distributed between left and right lateral positions (Table 8.23), while straight and parallel to the working edge shapes of the backing dominates (Table 8.24). However, there is a considerable number of medial fragments in the sample, which skews the distribution toward straight and parallel shapes, without the option of assessing the complete backing in detail. Some pieces that seem to have a straight backed and parallel to the working edge side may give a false impression due to an insufficient preservation of length. It is therefore important to point out that arched shapes are not an uncommon occurrence, and that other shapes are also reasonably well-represented. The mode of the backing is once again dominated by abrupt retouch, although fine retouch is also quite distinctly present (Table 8.25) Overall it appears that many fragmentary pieces can be reasonably assumed to have belonged to the arch backed type of microlith so common amongst the complete pieces. At the same time, pieces that likely belonged to the obliquely truncated and backed variety are not uncommon. In terms of shape of the backed edge, arched backed bladelets appear quite distinct, but in the case of the obliquely truncated and backed bladelets many pieces share some similarity with the curved pointed and backed bladelet group. It would probably be wrong to think of the Area D assemblage as being exclusively defined by arched backed bladelets. Rather the difference with Area A and B lies more in the addition of the arched backed bladelets to the overall spectrum of microlithic tool forms, rather than a complete replacement of one by the other.

The majority of microliths are commonly considered to have been part of composite projectile weaponry associated with hunting (Bar-Yosef 1987a). While this is undoubtedly true in many cases, and partially supported by archaeological evidence, finds also indicate a parallel use in other hafting arrangements (Edwards 2007). Use-wear studies (Anderson-Gerfaud 1983; Anderson 1991; Büller 1983; Richter 2007a) have shown a considerable degree of variation in the use of some Epipalaeolithic microliths. One can therefore infer that not all microliths at Ayn Qasiyya were necessarily connected to hunting. Other activities, such as the manufacture of other, organic objects (e.g., wooden or bone tools or tool handles, containers, etc.) likely also occurred and used microliths as part of the manufacturing process or in their use.

The high number of fragmentary microliths with respect to the lack of complete tools is a further interesting indicator of the activities carried out at the site. Broken microliths far outnumber complete pieces and it seems reasonable to assume that many were broken during manufacture or use. Since it can be safely assumed that microliths were fitted in composite tools the high indices of broken microliths in all three assemblages suggests that one common activity at the site was the maintenance and repair of such tools. Microliths broken during use were removed from hafts and handles and discarded and replaced by pieces manufactured on site. In the process of making replacements some microliths broke while retouching them and were also discarded on site. Other complete surplus pieces, as well as bladelet blanks, may have been taken away for further modification and use elsewhere.

DISCUSSION

Based on the data discussed throughout this chapter some essential points can be made about the assemblages from Areas A and B, and Area D. The Area A and B assemblages appear very similar with respect to typological characteristics of the toolkit, as well as in their technological characteristics. Area D, on the other hand, while being similar in its use of bladelets as the dominant tool blank, the production of non-geometric microliths and core morphology, nevertheless shows subtle, but important differences. The differences between Area A/B and D can be summarized here as follows:

1) *Raw material use:* Whereas light-blue/grey and dark-grey to black flints are the most common raw material found in Area A and B, a light-brown to yellowish flint is the most dominant type of raw material used in Area D. Although use of this flint declines further down in the sequence in Area D, it remains the most abundant flint used. This differential use of raw material sources suggests that different landscape locales were frequented for procurement, which likely relates to differential use of

the Azraq landscape and potentially different seasonal patterns of movement around this landscape. It would not be too far-fetched to also consider the potential differential access to raw material sources in the region to be based on various social and cultural norms meditated through kinship patterns or perhaps cosmological beliefs, if this access was socially restricted.

2) *Manufacturing gestures and techniques:* Although the general reduction sequence follows a very similar scheme in all three areas, debitage technical data on the debitage, especially amongst bladelets, has revealed subtle differences. In Area D a shift toward a blade/bladelet reduction following extensive core shaping by flake removal can be recognised. In Area B, however, the data appears to suggest that some cores, albeit not all, were immediately selected for blade-based reduction and prepared using crested blades. Differences in platform types and characteristics particularly amongst the bladelet debitage between Areas B and D indicates subtle variations in knapping technique. This variation can relate to a wide range of proxies ranging from direct or indirect hammers, to weight of hammer, platform control and preparation, to platform angle and striking velocity. While these differences can therefore not be directly relate to anyone technique, they nevertheless indicate a habitual differences in knapping between the two areas, which relate to intimate gestures and learned technical practices.

3) *Bladelet sectioning:* Following bladelet removal and the selection of suitable blanks, bladelets were simply retouched into desired shapes or first snapped and then retouched in Areas A and B. In Area D, however, small notches were retouched on one side of the bladelet, presumably after a large part of the backing had been applied already to one side of the bladelet, and then placed on an anvil to knock off a small segment. This resulted in the accumulation of a considerable amount of distal and proximal trihedral points. In most cases the resulting microlith pre form was further reduced by pressure flaking masking the microburin scar on the positive piece. This minute, but essential difference, shows a simple yet intricate type of technological variation between the assemblages, providing a fit with two contemporary early Epipalaeolithic lithic traditions in the region.

4) *Typology:* The differences in the shape of non geometric microliths between Areas A/B and Area D can once again be considered as minute, yet characteristic difference. Obliquely truncated and backed bladelets dominate the microlith spectrum in Areas A/B, in addition to a few other miscellaneous tool types. In Area D, obliquely trun-

cated and backed bladelets also occur, although in lower frequencies. But, here they are joined by a tool type rarely found in Area A/B, the arched backed bladelet. Once again, this difference reflects a more widely recognized pattern that differentiates the so called Kebaran industry from the Nebekian industry.

Having summarized the essential differences between the Area A/B and Area D assemblage, it is possible to assign the former to the Kebaran industry, whereas the latter falls within the expected spectrum of variability of the Nebekian. Ayn Qasiyya appears to be one of the only sites where these two contemporary industries occur in the same location. The lithic assemblage from Area A/B strongly resembles the inventory recovered from layer B at Kharaneh IV, situated ca. 40 km west of the Azraq Oasis. The Kharaneh IV layer B assemblage is also rich in obliquely truncated and backed bladelets and Muheisen (Muheisen 1988a, b) reports no use of the microburin technique at the site. Although we currently do not have a detailed report on any of the Kharaneh IV lithic assemblages, Muheisen suggested that layer A could be attributed to the early Kebaran and layer B to the late Kebaran, based on Bar Yosef's (Bar-Yosef 1970, 1981; Bar-Yosef & Vogel 1987; Goring-Morris 1995) sub division. While problems with the straightforward, typologically based assignation of assemblages to either the early or late Kebaran have been noted (Edwards 1987, 1989a; Edwards et al. 1996; Goring-Morris 1995; Hovers & Marder 1991), in other cases the stratigraphic evidence suggests that this subdivision is in some instances a recognizable pattern (Goring-Morris 1980, 1995: 153). Recent statistical analysis of early Epipalaeolithic industries also supports this argument (Stutz & Estabrook 2004: 1656). Sites with similar inventories can be found in the Jordan valley at Wadi el Hammeh 26 (Edwards 1987, 1989a, 2001; Edwards et al. 1996), Fazael IIIA, IIIB & VII (Bar Yosef 1970; Goring Morris 1980, 1995), and Ein Gev I (Bar Yosef 1970). Edwards (2004: 91) has recently argued that the early Epipalaeolithic of the eastern Jordan Valley, defined on the basis of the dominance of obliquely truncated and backed bladelet, microburin poor assemblages of Wadi el Hammeh 26, constitutes its own, distinct cultural variant. There appears to be some clear similarities between Ayn Qasiyya Area A/B and Edwards' Wadi Hammeh assemblages, especially with regards to the dominance of obliquely truncated and backed bladelets in the assemblage and the lack of the microburin technique. However, the presence of some Falita points in the assemblage may hint that the Ayn Qasiyya assemblage might be more similar to Ein Gev I and then to Wadi Hammeh 26. At the same time, however, micropoints are not nearly as prevalent at Ayn Qasiyya as they are at either Ein Gev I (Bar Yosef 1970) or the Fazael sites (Goring Morris 1980). The AMS dates obtained from section 1 and Area A are highly consistent with the interpretation of the assemblage as early Epipalaeolithic Kebaran, although the dates appear to situate the assemblage very early in the Kebaran compared to other dates currently available. The similarly constituted assemblage from Urkan e-Rubb II a, which has been dated by nine radiocarbon assays, is dated consistently later than the Ayn Qasiyya material.

In the Azraq Basin, sites in the Wadi Uweynid and Wadi el Jilat have produced microburin rich assemblages with the presence of La Mouillah and Qalkhan points, narrow curved pointed and arched backed bladelets (Byrd 1988; Byrd & Garrard 1989; Garrard, Baird & Byrd 1994; Garrard et al. 1988; Garrard & Byrd 1992). The assemblage from Uweynid 14 middle phase in particular bears some typological resemblance to elements of the Ayn Qasiyya Area D non geometric microliths with respect to the presence of narrow arched backed bladelets. The lower phase of Wadi Jilat 6 also contains narrow arched backed bladelets and both these assemblages have a high restricted microburin index (see Byrd 1988: 259, table 2). Radiocarbon dates from overlying deposits indicate that these assemblages predate ca. 21,000 cal.B.P. (see Garrard, Baird & Byrd 1994: 189 - 190). Elsewhere assemblages with an inventory similar in parts to that of Area D at Ayn Qasiyya include the Wadi Madamagh rockshelter (Schyle & Uerpmann 1988), those from the Wadi al Hasa (Tor Sageer, Yutil al-Hasa Area C, and Tor at Tareeq Coinman et al. 1986; Olszewski 2000, 2004), as well as sites in the Ras en-Naqb region of southern Jordan (Henry 1988a, 1990, 1995, 1998), Yabrud rockshelter 3 (layers 7 4, Rust 1950) and el Kowm 1 (Cauvin 1987/8; Cauvin et al. 1979; Cauvin 1981; Cauvin & Couqueugniot 1988).

Chapter 9:

AWS 48 Knapped Stone: *chaîne opératoire*

INTRODUCTION

This chapter discusses the chipped stone artefacts from AWS 48, with particular emphasis on Cluster 3. Initial visual inspection of the surface samples from all clusters at AWS 48 confirmed their general technological and typological homogeneity. It was therefore decided to concentrate the analysis on the excavated materials from Cluster 3 as representing all the assemblages at the site. However, artefacts from all the clusters were sorted and counted and they will be briefly discussed where relevant. In total 53,503 pieces were collected, with 15,030 pieces deriving from excavations at Cluster 3. All cores, core trimming elements and retouched pieces from Cluster 3 were analysed in detail, recording observations on technology and typology (Appendix II). In addition, a sample of 208 pieces of flakes, blades and bladelets were also analysed to gather technological data.

Initial visual inspection of the collected material from AWS 48 suggests that this site could be grouped within the Geometric Kebaran complex (Bar-Yosef 1970, 1981, 1987b; Bar-Yosef & Vogel 1987; Byrd 1998; Byrd 1994b; Fellner 1995a; Goring-Morris 1995; Goring-Morris & Belfer-Cohen 1998; Goring-Morris 1987; Henry 1989; Olszewski 2001b). Geometric microliths in the form of trapeze/rectangles are very abundant, while other tool forms are lacking. The composition of the assemblage and the typological characteristics of the geometric microliths are a strong indicator of a Middle Epipalaeolithic affinity for the assemblage. As such, the assemblage provides not only an opportunity to examine the middle Epipalaeolithic in the Azraq Oasis, but also to explore the role of standardization of microliths and shifting patterns of the use of the landscape over time. As in the previous chapter, this chapter will make use of the concept of *chaîne opératoire* to provide a detailed account of the characteristics of the assemblage and reveal aspects of the habitual techniques and gestures involved in the creation of the assemblage.

RAW MATERIAL USE

The raw material use at AWS 48 is extremely difficult to assess, since the majority of lithic artefacts from the site are heavily re-patinated (see chapter 7). Only two types of raw material could be distinguished on un-patinated material. The first is a mid-brownish red flint with some visible inclusions of high quality that occurs in the form of angular nodules. The second is a light-greyish to cream-coloured flint with few inclusions of good to medium quality. Since few cores could be assigned to this raw material (n=1) there is little data available indicating its origins. Figure 9.1 displays a high number of medium, brownish-red material among the cores and the debitage, whereas the re-touched artefacts are more commonly made on the light-greyish to cream flint. A Chi-Squared test confirms that this distribution is statistically significant. This would seem to suggest that tools were predominantly made on raw material of a type not ordinarily knapped on-site. By the same token, it suggests that tools made from the medium, brownish-red flint were not commonly discarded at the site, but instead taken away and used at different, unknown locales. The restricted range of raw materials at the site would seem to suggest highly transient movements around the landscape, which may have targeted very specific locales for raw material extraction or collection. At the same time, it would seem to indicate an interesting pattern of manufacture and tool production at the site, involving the discard of tools made from light-greyish to cream flint and their likely replacement by tools made from medium, brownish-red material. This, in turn, in-dicates that the medium, brownish-red flint was likely available in closer proximity to the site, as opposed to the light-greyish to cream material that may derive from further afield. Nodule shapes of the medium brownish-red flint tend to be rounded with partially abraded surfaces, and suggest this flint derives from nearby wadi beds. This kind of col-lection could have been done on-the-fly as people passed by known sources on the way to the Azraq Oasis.

CORE REDUCTION

As previously discussed in chapter 7 (Figure 7.27, 7.28), data available from the sorting of the artefacts from the five clusters where surface collections or excavations took place show that cores are rare in all samples, while chips and formal debitage are the most important categories. As previously discussed, due to the larger area in which surface collections were carried out, the samples from AWS48.I and AWS48.II are consid-ered the most reliable (see chapter 7). Tools are fairly common, although more so in Clus-ter 3 than in Cluster 1. Although primary flakes appear particularly common in Cluster 1,

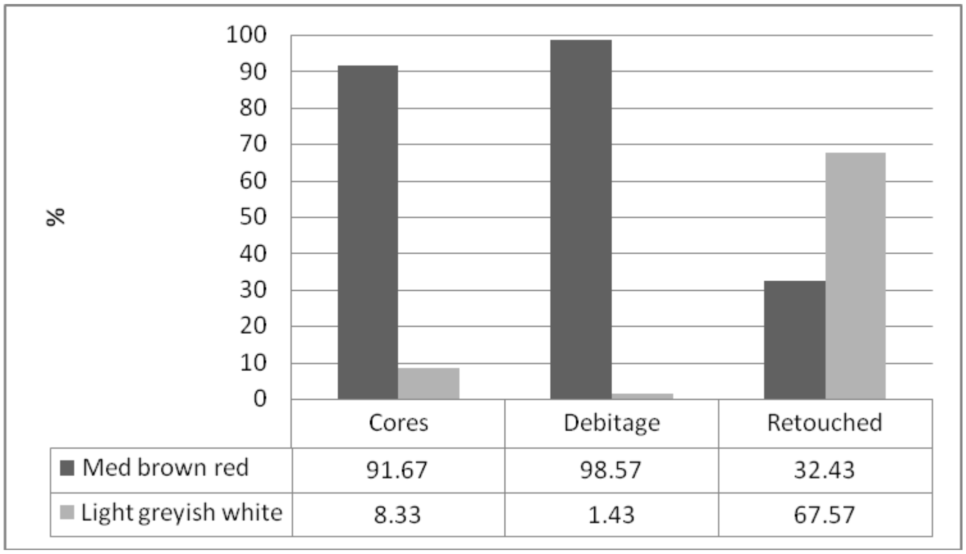


Figure 9.1: Raw material representation (where identifiable) at AWS48.III (cores: n=12; debitage: n=70; retouched: n=111).

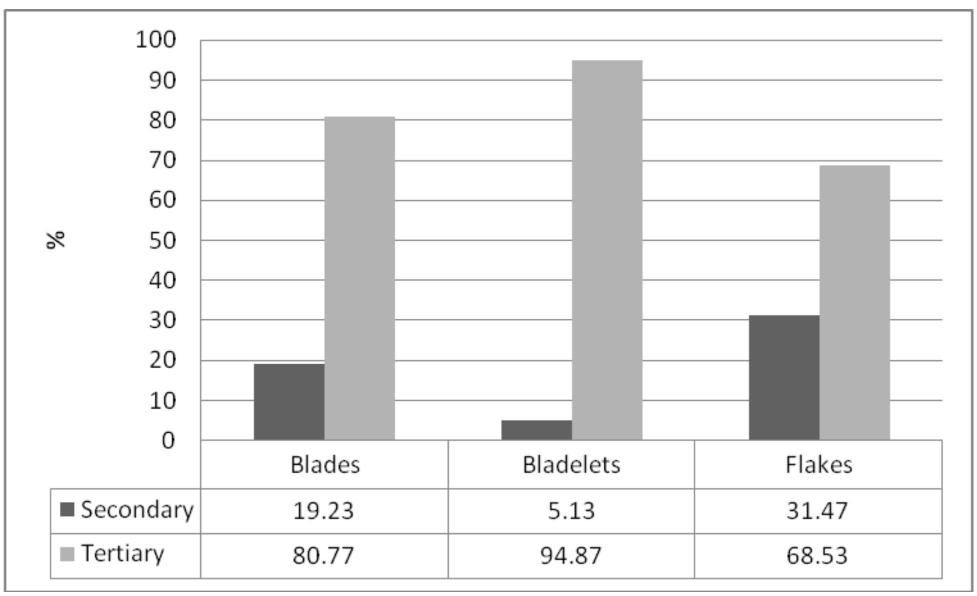


Figure 9.2: Frequencies of secondary and tertiary debitage in the sample from AWS 48.III.

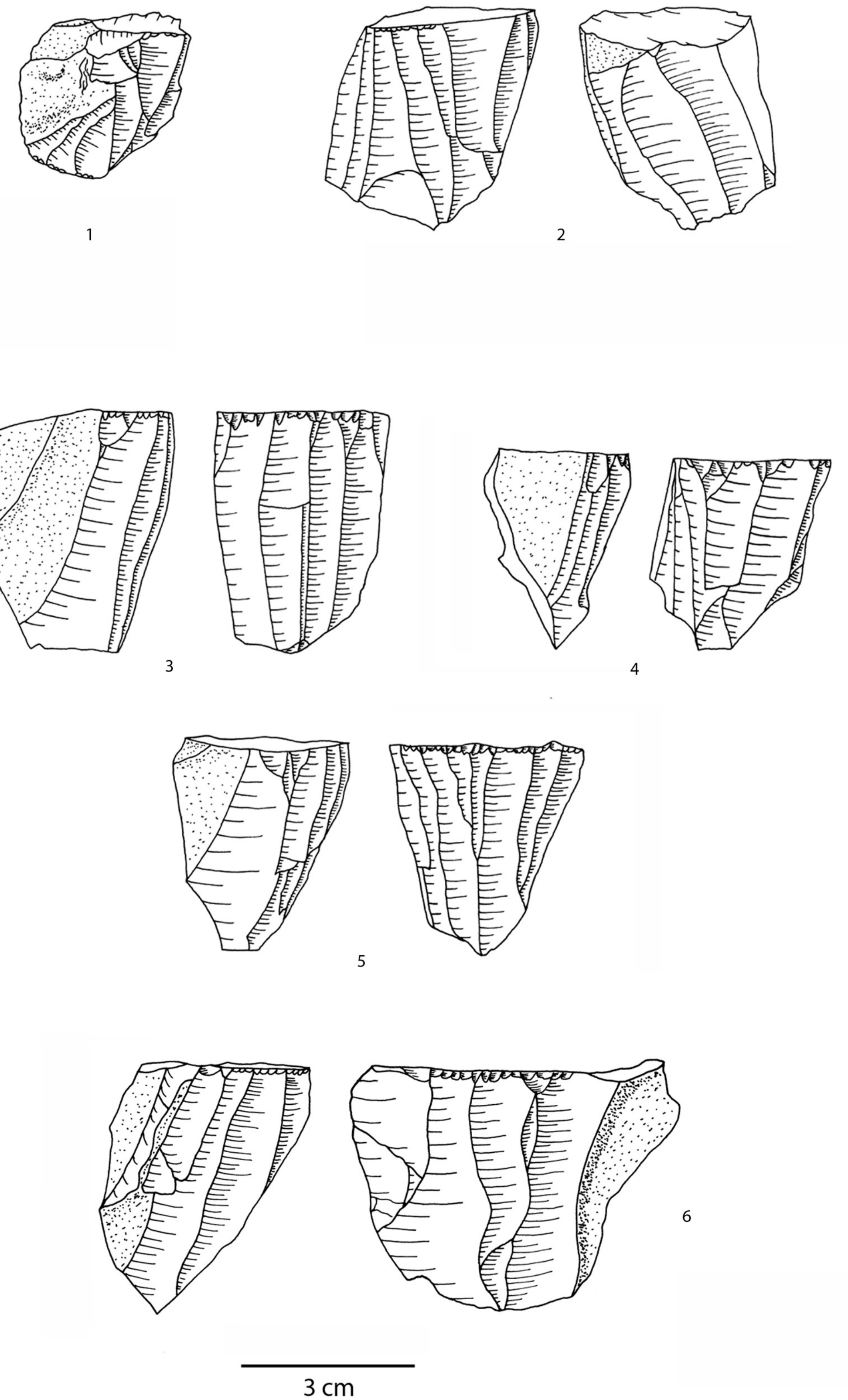


Figure 9.3: Cores from AWS48.III. #'s1, 3-6: single platform bladelet cores. #2: Opposed platform bladelet core.

overall they are not more common than in the other samples. Flakes far outnumber blades and bladelets in all clusters, suggesting a more generalized reduction sequence. Core Trimming Elements are moderately prevalent in all of the clusters, although they seem particularly abundant in Cluster 4. This initial data suggests, as previously discussed, that initial core reduction did not take place on-site. This is not surprising as there are no raw material sources in the immediate vicinity of the site. Initial, primary flakes are likely to have been taken off nodules away from the site at a location closer to or at the source. However, the prevalence of small debitage indicates that some knapping did take place at the site and that the site preserves overall integrity (see chapter 7).

Figure 9.2 indicates that the majority of blades and bladelets in Cluster 3 lack cortex, whereas a higher proportion of flakes (31.47%) fall within the secondary debitage category. This seems to indicate that initial core shaping did not take place at this locality and that the initial core reduction concentrated on the removal of flakes, which later shifted to the removal of blades and bladelets. Judging by the type of cores present in the sample from Cluster 3 which can in many cases be taken to represent the end result of the reduction sequence bladelet production predominated in the last stages of the reduction sequence (Table 9.1). Bladelet cores of various kinds make up more than 75% of all the cores from this cluster, far outnumbering flake cores. This strongly supports the idea that core reduction was first geared toward the shaping of cores, resulting in the production of flakes, and later shifted to the production of blades and bladelets, resulting in numerous tertiary blades/bladelets and used bladelet cores. Single-platform bladelet cores predominate, although these are of a different kind than the Ayn Qasiyya examples. At AWS 48, Cluster 3 single-platform bladelet cores tend to have a near circular or oval platform, with a broadly worked face that covers almost the entire circumference of the core (Figure 9.3). The overall shape tends towards a cone or pyramid. Double-platform

Core Types, AWS 48.III		%
Bladelet: 90 degree opposed	3	6.67
bladelet: double	4	8.89
Bladelet: double opposed	6	13.33
Bladelet: single	21	46.67
Flake: multiplatform	5	11.11
Flake: single platform	1	2.22
fragment: bladelet	3	6.67
Fragment: flake	2	4.44
Total	45	100

Table 9.1: Core types in the sample from AWS48.III

bladelet cores, double opposed platform bladelet cores and double 90 opposed bladelet platform cores also occur, indicating that cores were often intensively reduced. Indeed, some cores are very small, the most extreme example measuring only 26 mm in length and 22 mm in width. Average core length is 38.27 mm; while average width is 31.57 mm and average thickness is 32.9 mm. This shows that cores are generally small, with mainly flake cores falling into the larger size category. This reinforces the idea that flake cores may represent an earlier stage of production. In only 9 out of 45 cores were platforms not renewed, which also suggests a high degree of core maintenance. In 60% of the cases, platforms exhibit an angle of >75 degrees. The removal of bladelets along the entire circumference of the core suggests a very effective means to obtain as many bladelets from a core as possible. In contrast to the single-platform bladelet cores from Ayn Qasiyya cores, reduction techniques at AWS 48 necessitated the use of a raw material that occurs as a more rounded, spherical shape. These would therefore also require extensive core shaping prior to blade/ bladelet reduction.

Although platform rejuvenation is evidenced by unfacetted and uncrushed, fresh-appearing platforms on cores, very few core tablets occur in the sample (Table 9.2). The majority of Core Trimming Elements is made up of core face rejuvenation flakes, followed by partial ridged blades, core tablets, plunging flakes and ridged blades. The prevalence of core face rejuvenation flakes is an interesting tendency, since it shows that cores were rarely initially set up by creating ridged blades. Instead, *ad hoc* core maintenance, removing hinges, steps and other knapping errors, appears to have been more common. The lack of ridged blades is surprising, given the good representation of blades and bladelets in the assemblage, and could suggest that blade/bladelet cores arrived at the site already in some pre-formed shape. This is not entirely inconsistent with the data available from cortex cover on debitage. While secondary flakes are more numerous than secondary blades or bladelets, they are somewhat under-represented in Cluster 3 (Figure 9.2). If core shaping took place at the site one would expect to find a higher proportion of primary and secondary flakes in the sample. Since this is not the case, and ridged blades are also absent, it would appear that initial core shaping, and setting up of cores as blade/ bladelet cores occurred elsewhere. Cores thus appear to have arrived on-site in pre-prepared form ready for blade/bladelet reduction, which was carried out on-site and necessitated occasional repair and face rejuvenation.

An examination of the removal directions of the dorsal scars on debitage confirms that unidirectional core reduction was most commonly practiced in the sample from Cluster 3 (ranging from 73% to 97%; Figure 9.4). Most variability can be found amongst flake debitage where bidirectional and multiple platform cores sometimes occur. This suggests that a great deal of core shaping, while necessitating the rotation of cores and the use of several or multiple platforms, most commonly derived from single platforms. The use of bidirectional cores is attested in moderate frequency amongst blade debitage, although sample numbers are perhaps too low to suggest that this was a general tendency.

BLANK PRODUCTION

The following discussion of tool blank production is based on the detailed technological study of 207 pieces of debitage from AWS48.III, chosen at random. In all classes, secondary debitage is both longer and wider on average than tertiary debitage (Figure 9.5). In the case of secondary blades and bladelets, this tendency cannot be relied on, however, since the sample numbers in these groups (seven and two respectively) are too low to be indicative of wider patterns. This picture generally confirms that cortex was removed as part of the shaping of the core and that desirable blanks were prepared via a particular series of reductive steps (see above). Macrolithic tools are rare in the sample from Cluster 3, with the majority of tools being microliths. Only occasionally were flakes or blades selected for the manufacture of isolated scrapers, notches and so forth.

BLADES

Although the sample of blades from AWS48.III is restricted, it appears that they range among the longer pieces of debitage in this sample. With 59 mm in length for secondary blades, and 45.52 mm length for tertiary blades, they are, on average, much longer than flakes or bladelets (Figure 9.5). Indeed, some very long examples occur (Figure 9.6). Blades are also, on average, significantly wider than bladelets although they appear to cluster around the 14-15 mm (Figure 9.7). Flat, thin and punctiform platforms occur in equal measure among bladelets, with isolated instances of other platforms (Figure 9.8). The sample discussed here indicates that blades were generally well-executed, with very few hinges, steps or plunging terminations (Figure 9.9). The majority of terminations are feathered, suggesting that removal strikes were well-guided and of sufficient force. Bulbs of percussion are more often pronounced on blades (Figure 9.10), and lips are also more frequent (Figure 9.11). It is difficult to reconstruct blade production techniques on the basis of this data. Platform and bulb characteristics occur in no distinct patterns. The sample of 26 blades discussed here may be considered too restrictive a sample to allow such predictions.

CTE		%
Core face rejuvenation	30	71.43
Core tablet	3	7.14
Partial ridge blade	6	14.29
Plunger	2	4.76
Ridge blade	1	2.38
Total	42	100

Table 9.2: AWS48.III: Core Trimming Elements by category

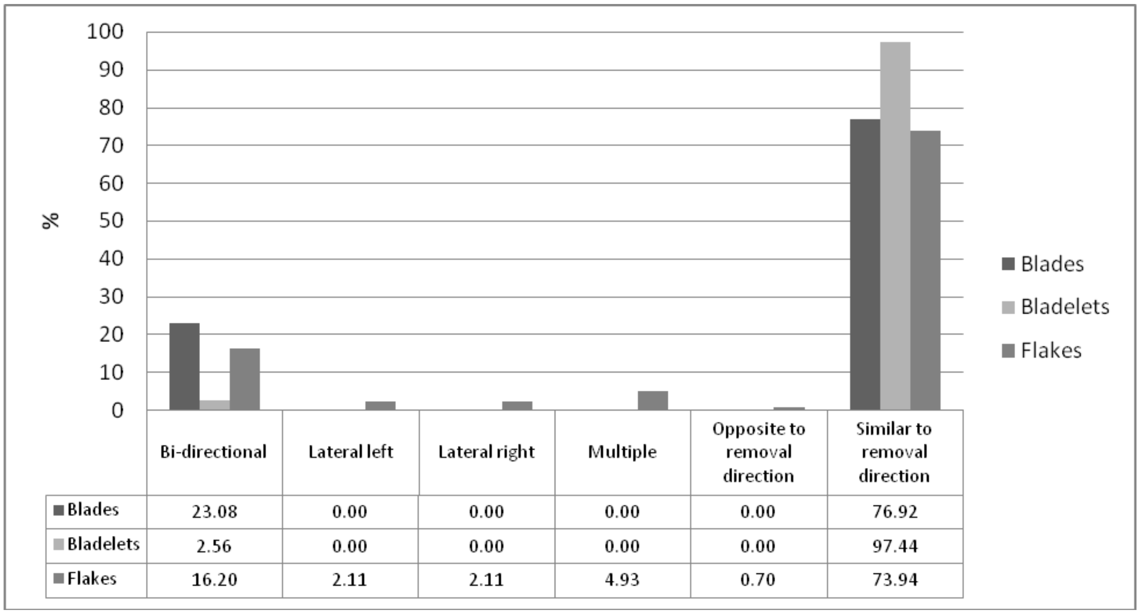


Figure 9.4: AWS48.III: Frequencies of dorsal scar directions.

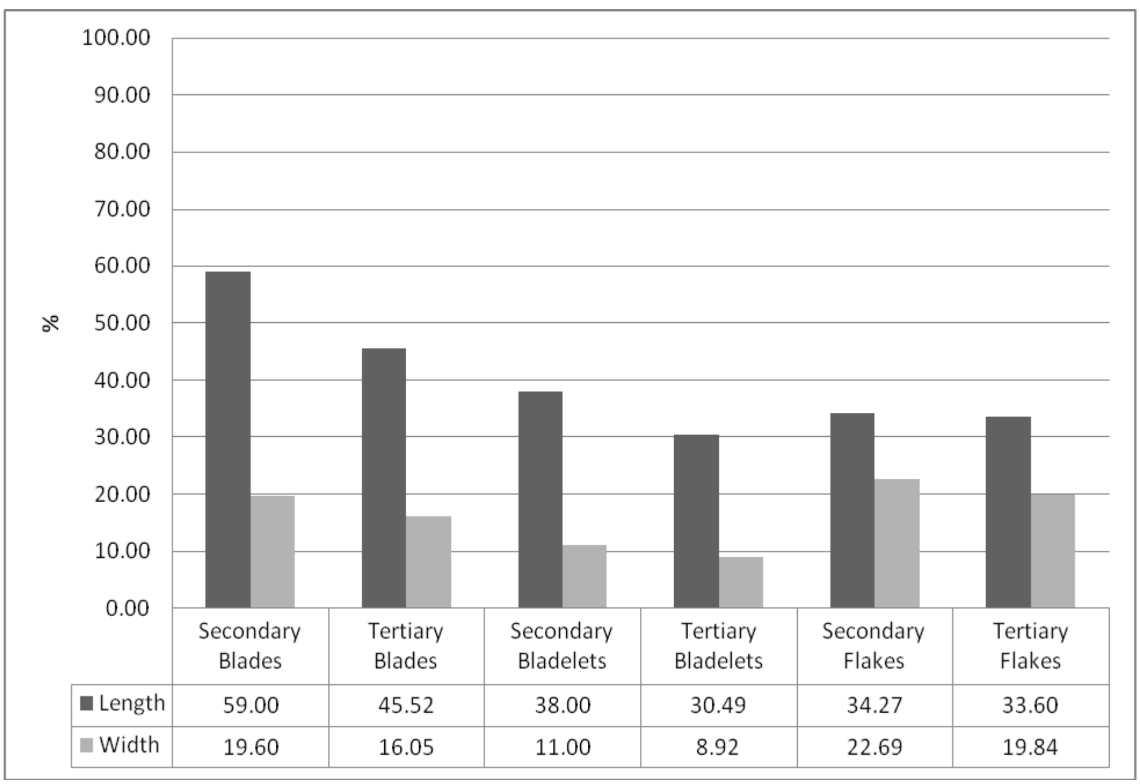


Figure 9.5: Average length, width and thickness amongst blades, bladelets and flakes at AWS 48.III.

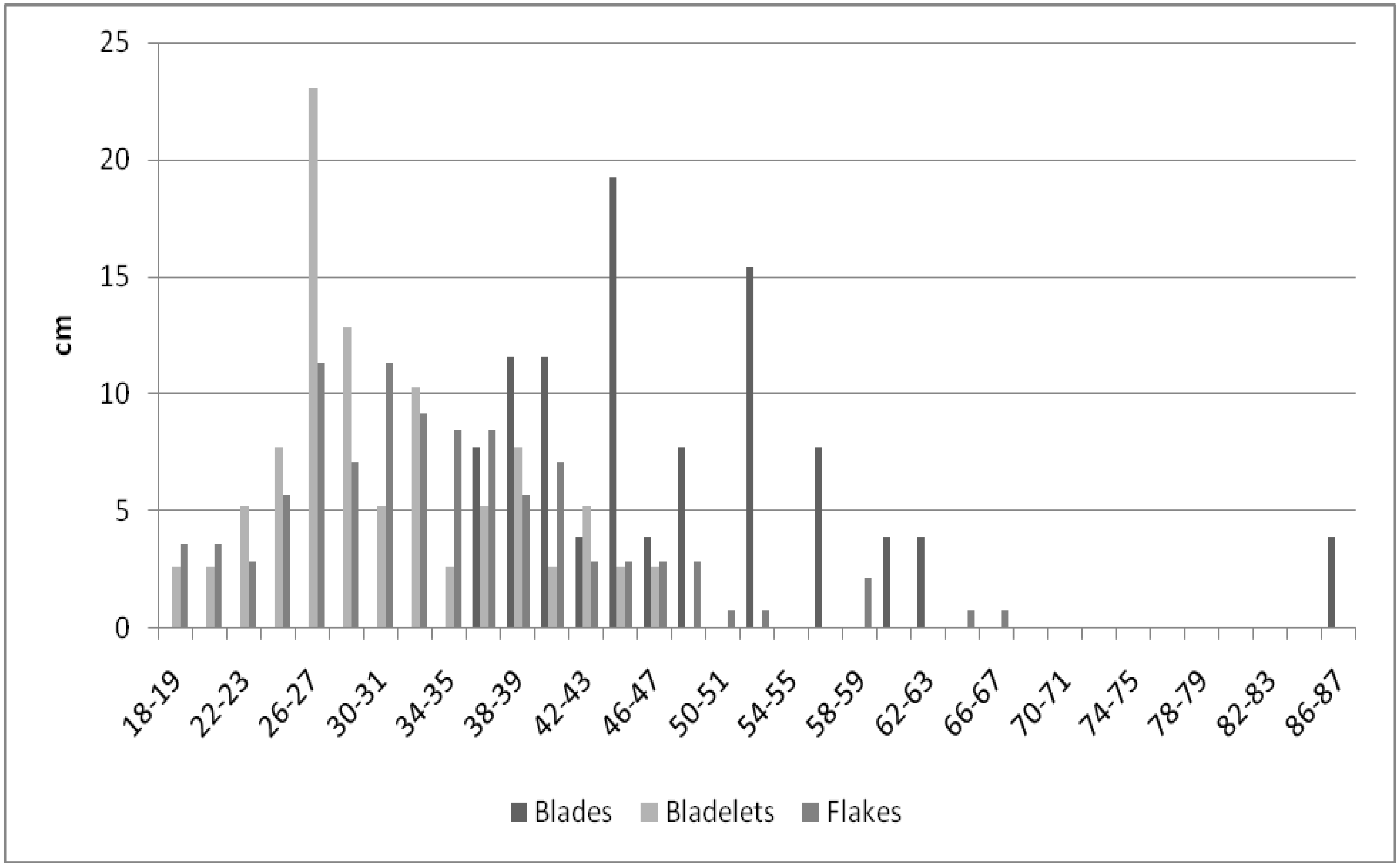


Figure 9.6: Length frequencies for blades, bladelets and flakes at AWS48.III (blades: n=26; bladelets: n=39; flakes: n=142)

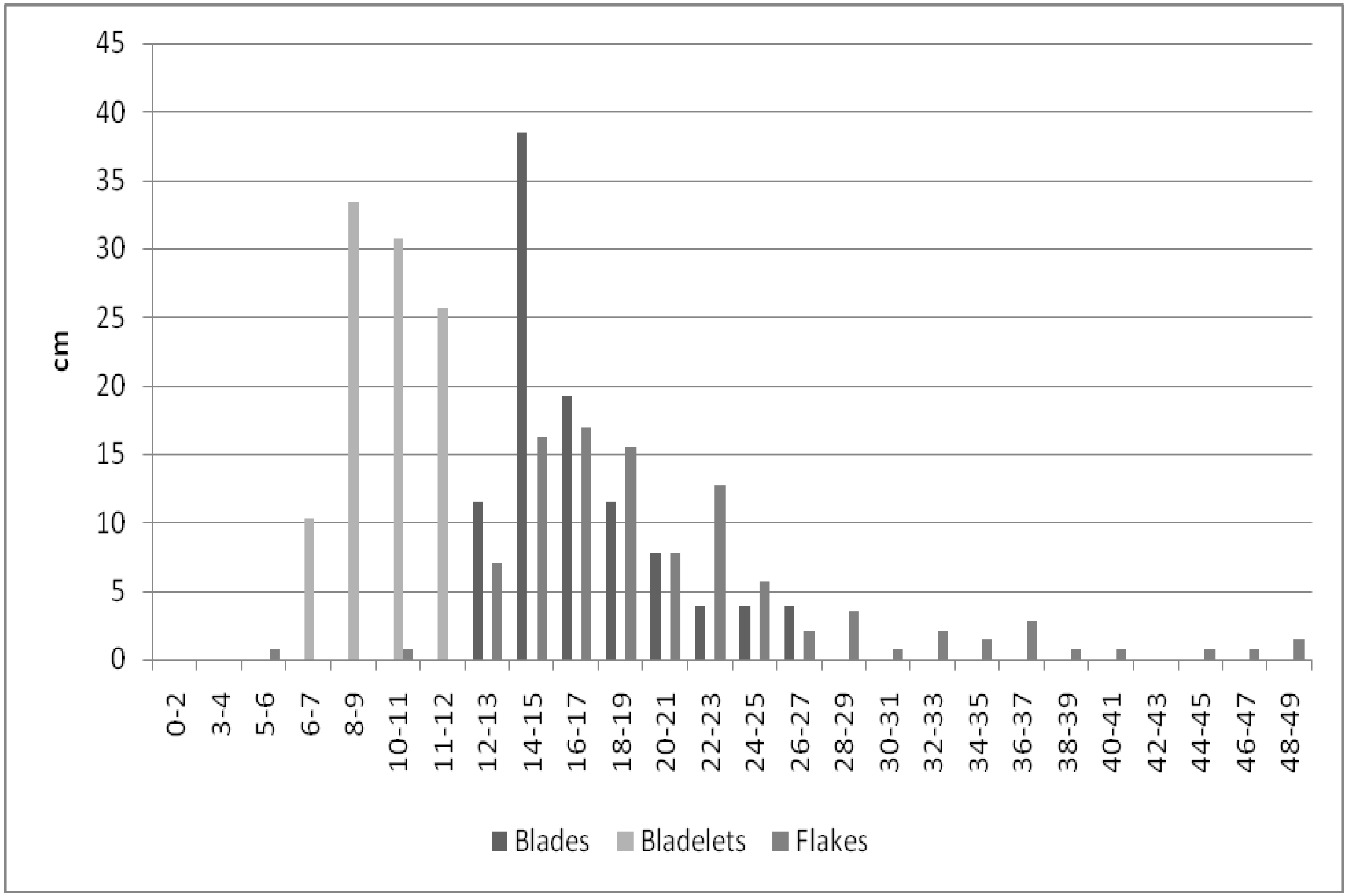
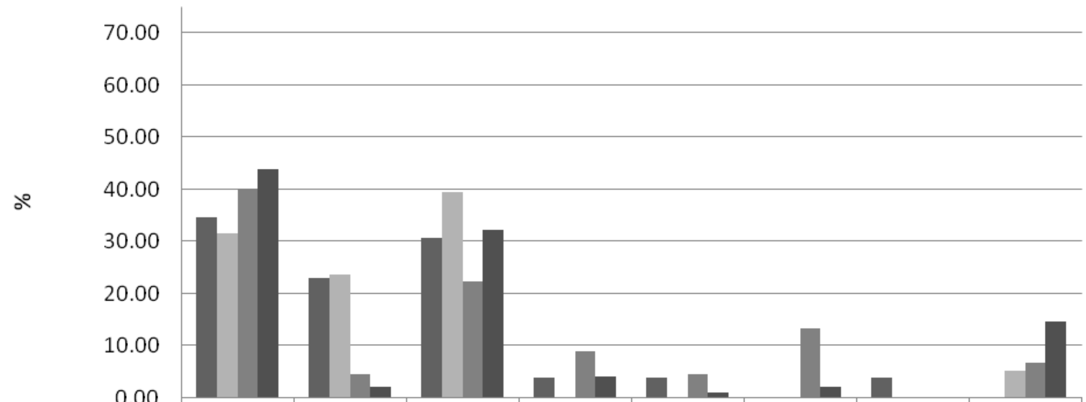
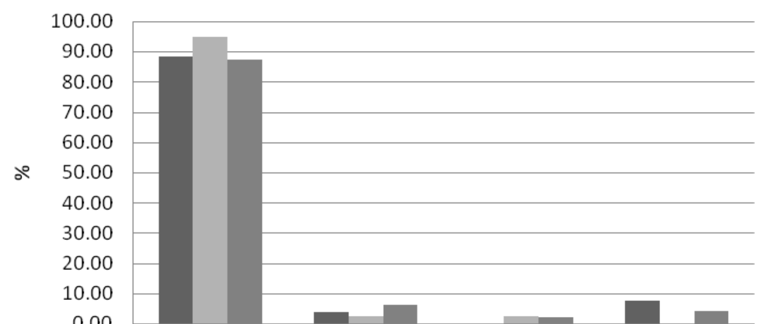


Figure 9.7: Width frequencies for blades, bladelets and flakes at AWS48.III (blades: n=26; bladelets: n=39; flakes: n=142)



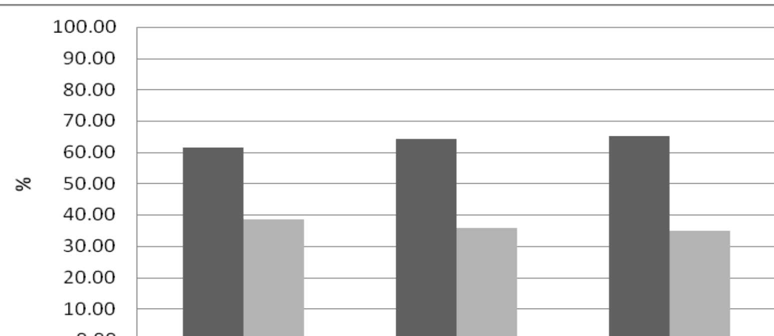
	Flat	Punctiform	Thin	Dihedral	Facetted	Cortical	Spur	Winged
Blades	34.62	23.08	30.77	3.85	3.85	0.00	3.85	0.00
Bladelets	31.58	23.68	39.47	0.00	0.00	0.00	0.00	5.26
Secondary Flakes	40.00	4.44	22.22	8.89	4.44	13.33	0.00	6.67
Tertiary Flakes	43.75	2.08	32.29	4.17	1.04	2.08	0.00	14.58

Figure 9.8: Frequencies of platform types at AWS48.III (blades: n=26; bladelets: n=38; sec. flakes: n=45; tert. Flakes: n=96)



	Feather	Hinge	Step	Plunge
Blades	88.46	3.85	0.00	7.69
Bladelets	94.87	2.56	2.56	0.00
Flakes	87.41	6.29	2.10	4.20

Figure 9.9: Frequency of different terminations on debitage at AWS48.III (Blades: n=26; Bladelets: n=39; Flakes: n=143)



	Blades	Bladelets	Flakes
Salient	61.54	64.10	65.03
Diffuse	38.46	35.90	34.97

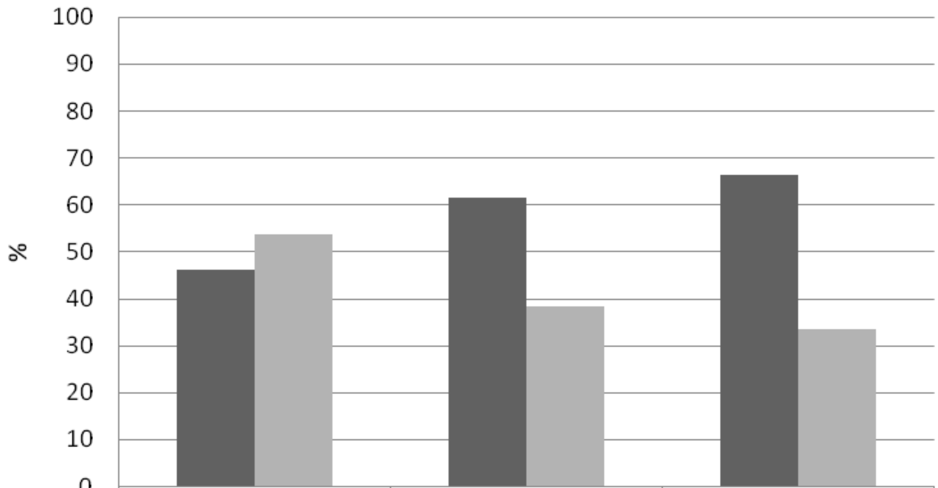
Figure 9.10: Frequency of salient versus diffuse bulbs of percussion at AWS48.III (Blades: n=26; Bladelets: n=39; Flakes: n=143)

Bladelets

Although the bladelet sample obtained from AWS48.III only amounts to 39 pieces, it provides relevant insight into the nature of the bladelet technology in this cluster. Secondary bladelets are both longer and wider on average than tertiary bladelets (Figure 9.5). This is consistent with an increasingly smaller nucleus as core reduction progresses. The majority of bladelets fall into the 24-31 mm length range, and cluster around the 7-10 mm width range (Figure 9.6 and 9.7). They are clearly distinguishable from blades, which are on average much wider. Preserved proximal platforms on bladelets indicate an abundance of flat and thin platform types, with punctiform platforms representing the third most common type (Figure 9.8). Bulbs of percussion are more often visible (Figure 9.10), and lips occur less often (Figure 9.11). As amongst blades, bladelets are well executed with few showing signs of hinge or step terminations (Figure 9.9). Dorsal scar patterns indicate that bladelets are almost exclusively derived from single-platform cores, with only one example of a bidirectional strategy (Figure 9.4). This would seem to suggest that once bladelets were produced, cores were well-prepared for standardized single-platform reduction, as evidence by the highly standardized appearance of cores in the sample from Cluster 3.

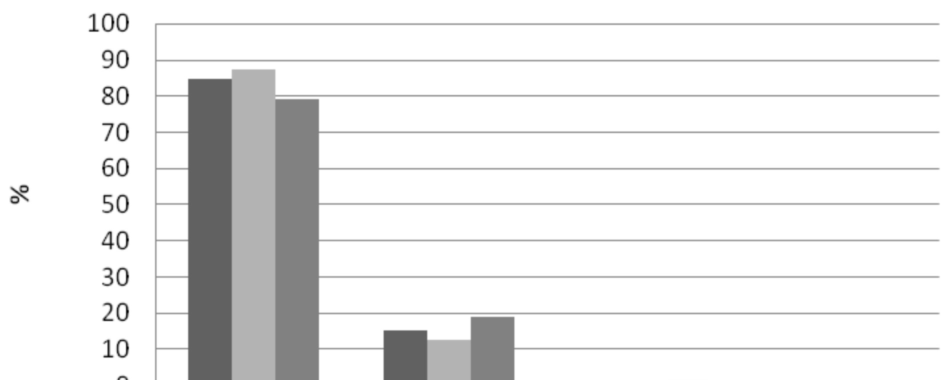
Flakes

Although flakes could be expected to show a higher degree of diversity, the 142 flakes analysed as a sample from AWS48.III appear as a fairly homogeneous group. The majority fall between 26 and 41m in length, and between 13 and 25 mm in width (Figure 9.5 and 9.6). Average width and length ratios for secondary and tertiary flakes are not significantly different, with tertiary flakes being on average somewhat shorter and narrower. Compared to blades and bladelets there is a higher degree of diversity amongst flake platform types (Figure 9.8). However, thin and flat platforms clearly predominate. Winged platforms form the third most common group, with lower counts of dihedral, cortical, punctiform and facetted platforms representing the other types. The abundance of flat and thin platforms seems to indicate frequent platform rejuvenation and, likely, the use of direct soft hammer percussion for core flaking. There are a higher proportion of flat and thin platforms among tertiary flake debitage, with dihedral, cortical and facetted platforms being marginally more common among secondary flakes. However, bulbs are more often visible (Figure 9.10), while lips are present on many flakes (Figure 9.11).



	Blades	Bladelets	Flakes
No lip	46.15	61.54	66.43
Lip	53.85	38.46	33.57

Figure 9.11: Frequency of lips versus no lips on debitage platforms at AWS48.III (Blades: n=26; Bladelets: n=39; Flakes: n=143)



	None	Percussion ripples	Edge Feathering	Feathering & ripples
Blades	84.62	15.38	0.00	0.00
Bladelets	87.18	12.82	0.00	0.00
Flakes	79.02	18.88	1.40	0.70

Figure 9.12: Frequency of ventral characteristics amongst debitage from AWS48.III (Blades: n=26; Bladelets: n=39; Flakes: n=143)

There are, on average, more flakes with percussion ripples on the ventral surface than in other debitage classes, although most flake ventral surfaces are characterised by the absence of any characteristics (Figure 9.12). As is the case for blades and bladelets, this data is somewhat ambiguous with respect to reduction techniques. It would appear that indirect, soft hammer, and hard hammer percussion were probably used by flintknappers at AWS48.II. Knapping errors, as evidence by the presence of hinge, step and plunging terminations, are more common among flakes than blades, but all debitage here are still dominated by feathered terminations (Figure 9.8).

RETOUCHED ARTEFACTS

A total of 648 retouched pieces were collected from Cluster 3 at AWS 48 and this entire sample was analysed technologically and typologically to provide information on potential on-site activities and chronological affinities of the assemblage. The vast majority of the retouched pieces are microliths, constituting 91.2% of the sample (Figure 9.13; Table 9.3 and 9.4). The second and third most important groups, trailing far behind, are simple retouched pieces (3.4%) and notches/denticulates (2.62%). Other formal tool types (scrapers, truncations, burins) are rare. The high number of microliths clearly highlights the Epipalaeolithic character of this assemblage. The restricted tool spectrum poses some interesting questions with regards to the kind of activities conducted at AWS 48, and will be addressed below.

Due to post-depositional alterations of the assemblage (i.e., chemical and physical weathering), an assessment of the raw materials used for tool production is difficult. Although in many cases, raw material type determinations of retouched artefacts was impossible due to the high level of patination, use of light-greyish to cream coloured flint was more common than the medium, brownish-red flint (Figure 9.1). However, it is difficult to assess whether this is a real pattern, due to the heavy bias induced by post-depositional weathering.

MACROLITHS

Macroliths are represented by scrapers, burins, notches/denticulates and informal or expediently retouched pieces (Figure 9.14). The latter comprise the most abundant group of macroliths in the sample, and retouched flakes are the most abundant in this group. These are generally informal pieces with fine or nibbled retouch along either the left or right margins. Only one backed blade was found in the sample. Notches and denticulates are the second most common group of macroliths. Amongst these denticulates are very rare, with single notched pieces dominating the group. Scrapers are quite rare in the sample, the vast majority being endscrapers, which are commonly made on blades/bladelets. Only one sidescraper was found. Burins are also very rare. This may indicate a lack of raw material scarcity (see chapter 8) or simply an expedient use of raw materials, if burins are considered primarily as an artefact of an intensified raw material exploitation strategy (see discussion in chapter 8). On the other hand, if burins are robust cutting implements or perforators, their rarity in the sample suggests a relative lack of need for such tools at AWS 48.

The overall impression of the AWS 48 macrolithic retouched component is one of expedience and limited variation. Retouched flakes and blades and notches/denticulates likely relate to a limited range of composite tool maintenance activities, as well as associated manufacture or repair of other organic material culture. The lack of scrapers seems to indicate an absence of secondary animal processing activities, such as hide scraping, on-site. The lack of a variety of macrolithic tools is not uncommon at Geometric Kebaran sites, which are often characterised by an over abundance of microliths, specifically trapeze/rectangles (Goring Morris 1987; Henry 1989). The lack of variation amongst macroliths, as well as their restricted number, highlights an understanding of the occupation at AWS 48 as a short-term and probably highly seasonal camp site, which was orientated toward the performance of a restricted number of set tasks.

MICROLITHS

Microliths make up the single most important group of retouched pieces at AWS48.III. The observed variability in this sample is again very restricted (Table 9.4; Figure 9.15). The vast majority of complete pieces is trapeze/rectangles, with a low number of obliquely truncated and backed bladelets, double truncated and backed bladelets, and simple backed bladelets. However, the majority of the sample is constituted by broken or incomplete pieces. This mirrors the perspective from Ayn Qasiyya, where a high number of microliths were also fragmented. Trapeze rectangles are characterised by a double truncation segmenting the bladelet's distal and proximal, as well as backing along one lateral side of the piece, resulting in a highly geometric shape (Bar Yosef 1970; Goring Morris 1987). The total number of analysed trapeze/rectangles from AWS 48.III is 194. They average 17.58 mm in length and 7.01 mm in width. Figure 9.16 shows a normal distribution for trapeze/rectangle length that peaks between 14 and 20 mm. Trapeze/rectangle width appears remarkably standardized with more than half of the analysed sample falling into the 7 mm width range and ca. 40% falling into the 6 or 8 mm width

Microliths	591	91.20%
Burins	4	0.62%
Scraper	6	0.93%
Notches & Denticulates	17	2.62%
Truncations	8	1.23%
Simple retouched	22	3.40%
Total	648	100.00%

Figure 9.3: AWS48.III: Major retouched artifact groups

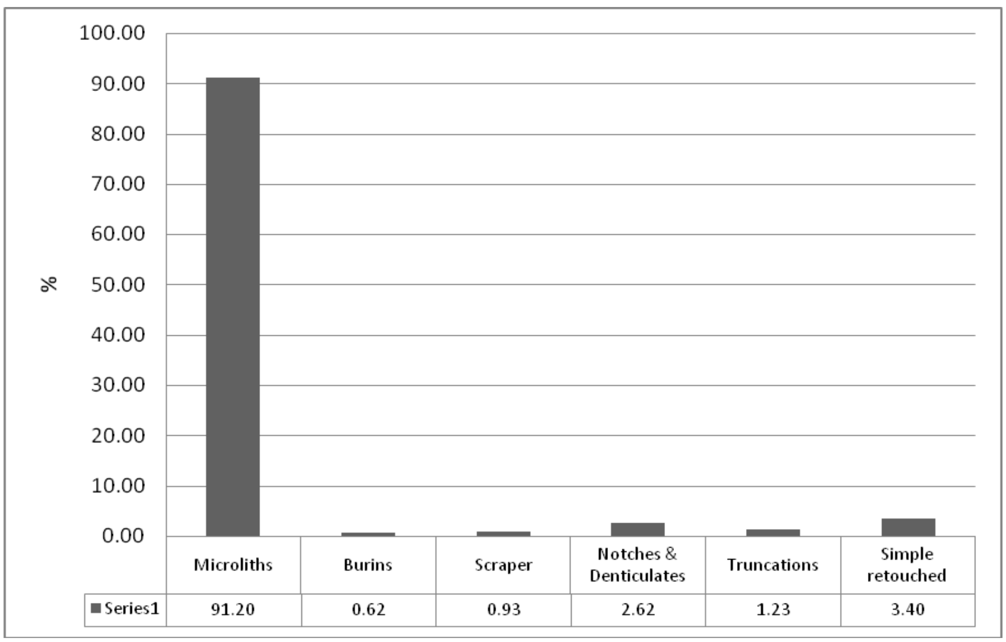


Figure 9.13: Frequency of major retouched artefact groups at AWS 48.III (for absolute numbers see table 9.3).

Microliths	**590**
Backed Bladelet	6
Double truncated and backed bladelet	3
Obliquely truncated and backed bladelet	6
Obliquely truncated bladelet	2
Retouched bladelet	1
Retouched/ backed fragment	378
Trapeze-rectangle	194
Burins	**4**
Burin on break/ natural surface	3
multiple/ mixed	1
Scrapers	**6**
Endscraper	5
Sidescraper	1
Notches & Denticulates	**17**
Denticulate	2
Notched piece	15
Truncations	**8**
Single truncation	7
Double truncation	1
Simple retouched/ utilised	**22**
Backed blade	**1**
Retouched blade	**4**
Retouched flake	**16**
Utilised blade	**1**
Piquant triedre	**1**
Total	**648**

Table 9.4: AWS48.III: Specific retouched artifact list

range (Figure 9.17). This evident standardised width is likely related to the requirements of existing composite tool haft slots. Observations on the shapes of distal and proximal truncations indicate that oblique flat and oblique concave shapes are the most common types (9.18). Straight truncations also occur in reasonable frequency. Backing location is almost evenly distributed between the left and right lateral, revealing no particular patterning (Table 9.5). This is also the case for the mode of retouch (Table 9.6). Abrupt backing dominates in over 90% of cases, with bipolar, semi-steep and fine retouch trailing far behind. The shape of the backed edge is relatively evenly distributed between straight and parallel to the opposite edge, concave, and straight but not parallel to opposite edge (Table 9.7).

Broken and incomplete microliths constitute the largest type of microlith in the sample discussed here (Table 9.4). A majority of pieces show truncations at either distal (46.74%) or proximal (20.11%) end, suggesting that many are likely broken trapeze/ rectangles (Table 9.8). A significant number of medial backed fragments also occur (24.18%). Other types of fragments occur in less frequent numbers and are not particularly diagnostic. As in the case of complete trapeze/rectangles, backing location is almost evenly distributed between left and right (Table 9.9). There is also no difference in the shapes of distal and proximal truncations (Figure 9.19). As amongst the complete trapeze rectangles, the majority of fragments show distal truncations with oblique concave, oblique flat or straight shapes. Straight shapes are, however, rare amongst the proximal truncations, similar to the complete trapeze/rectangles. Retouch modes on fragmented microliths are also highly clustered in the abrupt class, which amounts to almost 90% of the sample (Table 9.10). Straight forms of backing, either parallel or not to the working edge, are the dominant shape of backing amongst incomplete microliths (Table 9.11). There seems to be a somewhat higher degree of diversity, though, amongst the other types of backing shapes, even though concave is quite an important shape overall. This data indicates that a vast majority of these are likely to have once been trapeze/ rectangles, given the regular shape of backing and truncations.

The characteristics of the microliths at AWS 48 in particular, clearly indicate the affinity of this assemblage to the Geometric Kebaran complex, in which trapeze/ rectangles dominate the retouched pieces (Bar-Yosef 1970, 1981; Byrd 1998; Byrd 1994b; Fellner 1995a; Goring-Morris 1995; Goring-Morris & Belfer-Cohen 1998; Goring-Morris 1987; Henry 1989). In how far this assemblage is similar to other Geometric Kebaran assemblages from the Southern Levant will be discussed below. The high number of broken or incomplete trapeze/rectangles in the sample discussed here suggests that this locality likely was a primary production site for geometric microliths, and tool repair/replacement occurred regularly. However, breakage of geometric microliths likely occurred both during tool use and tool production. Applying secondary modification to a delicate microlith carries the inherent risk of breaking the artefact, as pressure is applied during the creation of a backed edge or truncation. It is relatively common to break or snap a thin bladelet in half when applying pressure to shape one of its sides. Breakage also occurs, however, as a result of use. It is commonly understood that microliths were hafted in handles in arrays to perform a variety of tasks (Büller 1983; Tomenchuk 1983). The abundance of broken pieces at AWS 48.III therefore likely not only reflects the breakage of microliths during manufacture, but also the removal and discard of broken pieces from composite tool hafts. The two activities, production and tool maintenance, are of course related. Repair of composite tools requires replacement of microliths, necessitat-

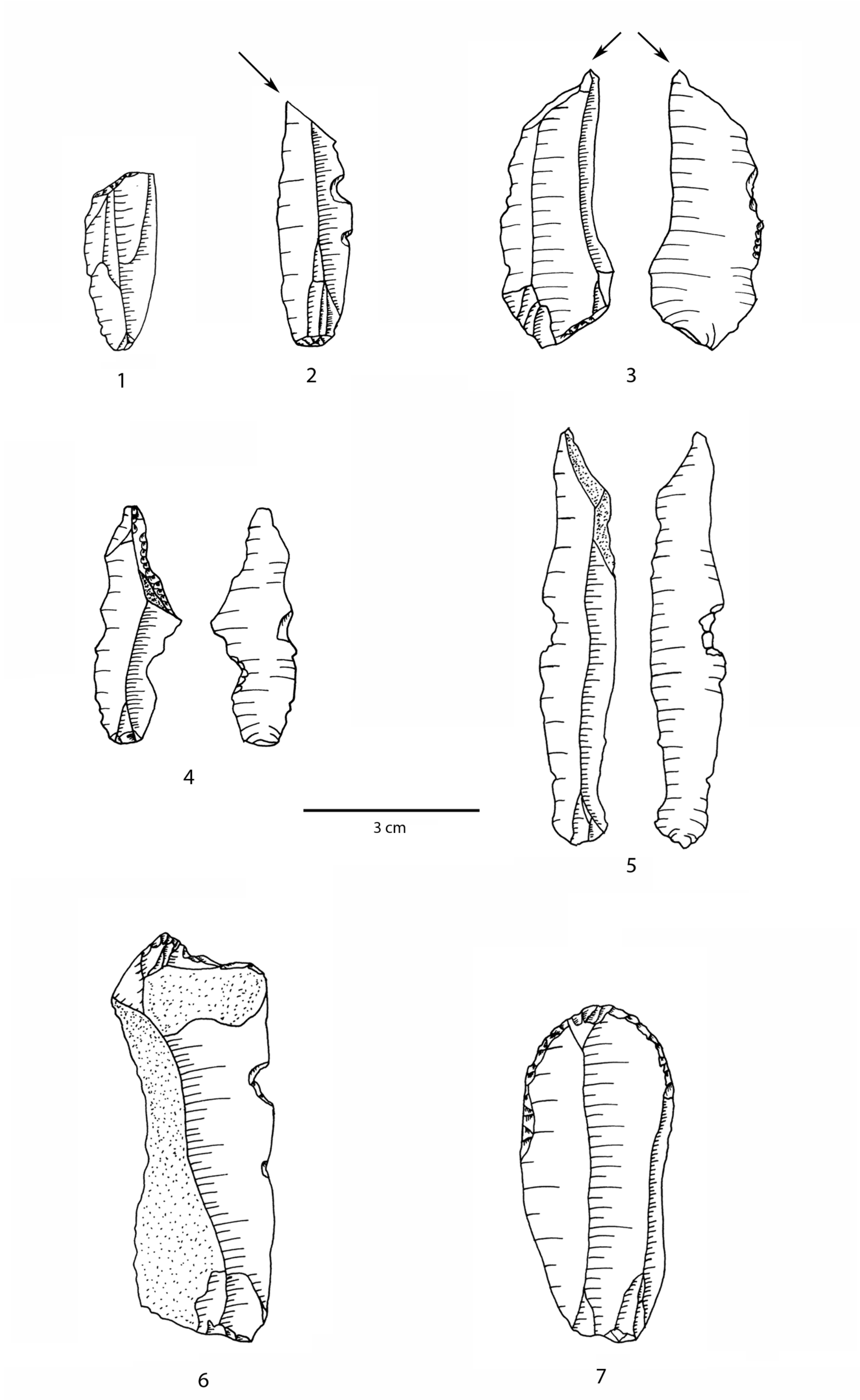


Figure 9.14: Macrolithic retouched pieces from AWS48.III. # 1: single truncation; #2 & 3: burins; # 4-5: notches; # 6-7: endscrapers

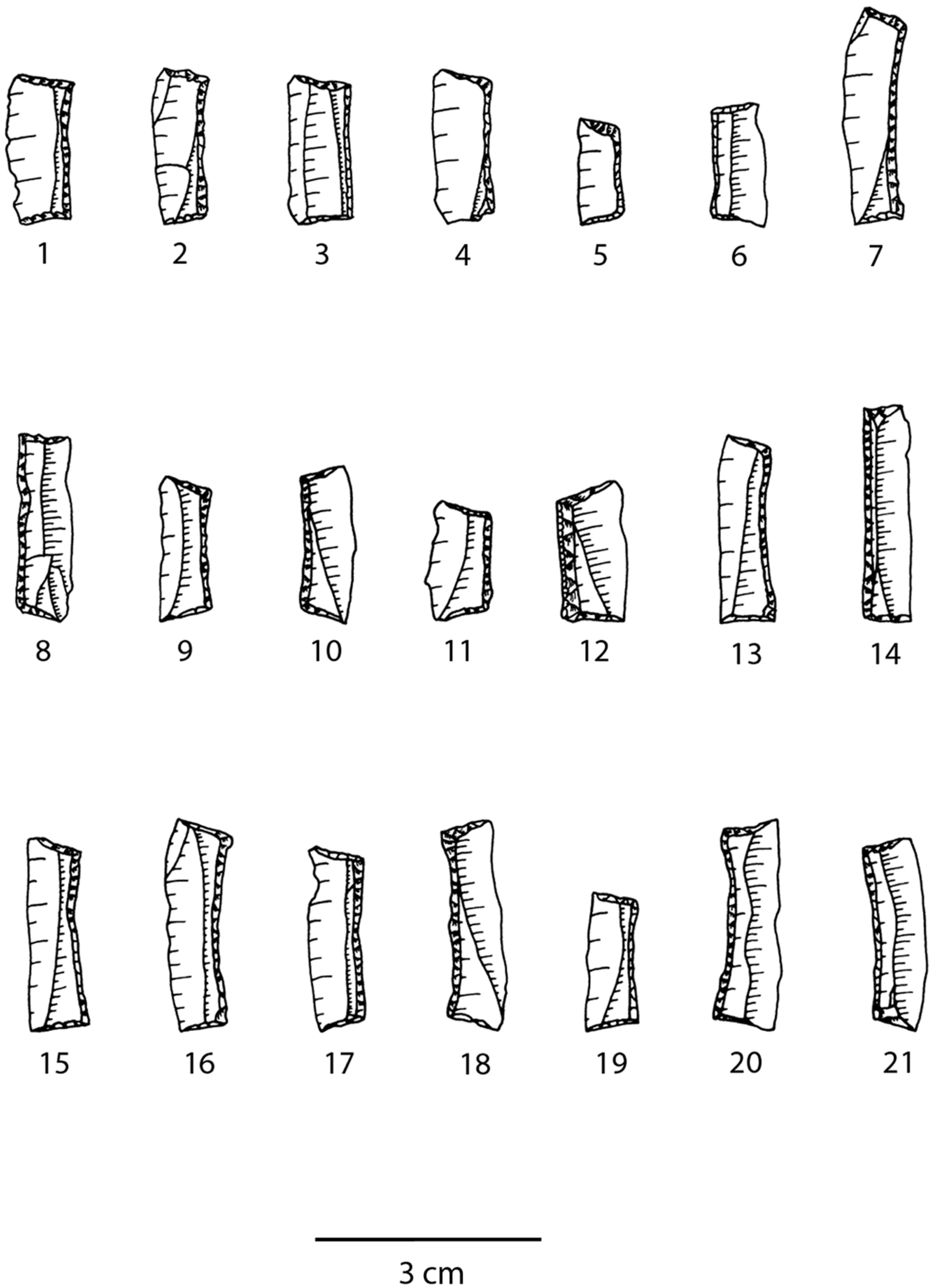


Figure 9.15: Trapeze-rectangles from AWS 48.III

ing their production. In this respect, it is interesting to note the abundance of complete trapeze/rectangles in the sample, which raises the question of why they were discarded. It seems reasonable to assume that a significant proportion of the complete trapeze/rectangles in the sample are part of an overproduction of geometric microliths, many of which were rejected for use, discarded, or simply lost at the site. Some may have been left in broken handles that have now decayed away. In any case, AWS48.III was a site of both tool maintenance and production.

DISCUSSION

The nature of the AWS 48 samples poses some challenges to the reconstruction and understanding of the *châine opératoire* at the site. The post depositional weathering of the flint obscures a critical aspect of the initial *châine opératoire*: raw material selection and procurement. Further aspects are difficult to assess due to the fairly eclectic composition of the assemblage, which is related to the nature of the past technological system. Differences between the samples obtained from the various clusters are also difficult to discuss, due to differences in sample sizes and the limited analysis carried out on the materials not from AWS 48.III. However, some aspects and tendencies with regards to the *châine opératoire* can nevertheless be discussed.

Given that the majority of cores derive from angular nodules it seems reasonable to assume that they were obtained from either primary or secondary deposits. More often than not signs of rolling or abrasion are absent so that they are unlikely to derive from wadi beds. It seems therefore that knappers either directly mined them from flint beds in limestone outcrops or from secondary sources, such as slopes or valley bottoms were the material had eroded into. Most time, this procurement strategy is likely to have been part of people's movements through the landscape from camp to camp. At other times, it may have been a more targeted activity, involving mining specific sources. The limited examination of raw material types suggests that knappers targeted high quality flint, such as the medium, brownish-red flint identified at several clusters of AWS 48 is a very fine grained crystalline rock, which appears to have very good knapping qualities. Knappers likely returned to particular locations known to yield high quality raw materials and may have incorporated these on their passages through the landscape.

Initial core shaping did not take place at AWS 48, since few primary elements or debitage related to initial core preparation were found. Almost the entire early stage of core reduction appears to be absent from the AWS 48 assemblages. Cores arrived at AWS

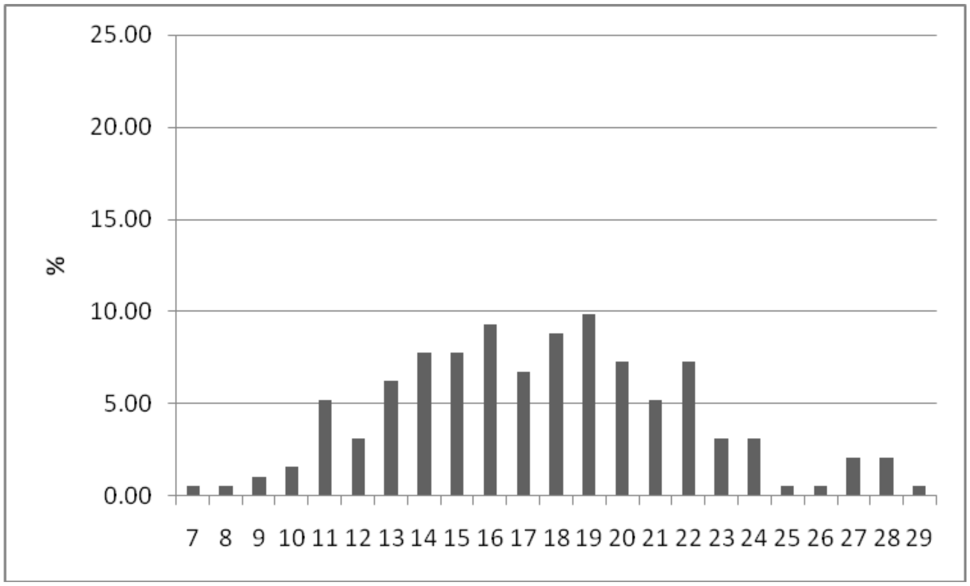


Figure 9.16: Length frequency of trapeze-rectangles at AWS48.III (n=194)

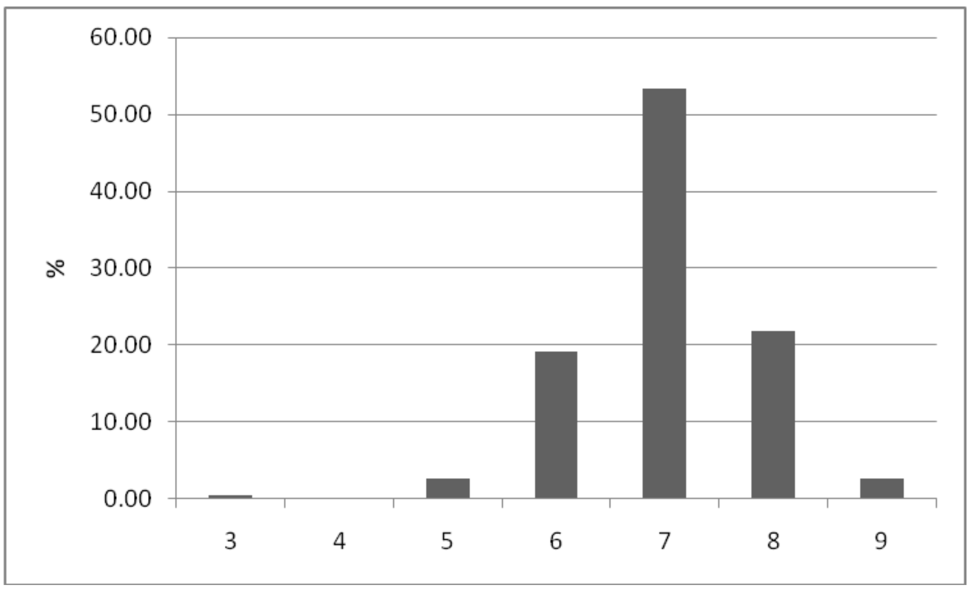


Figure 9.17: Width frequency of trapeze-rectangles at AWS48.III (n=194)

Backing Location		%
Left	109	56.19
Right	85	43.81

Table 9.5: Location of backing on AWS48.III trapeze-rectangles

Backing retouch type		%
Abrupt exterior	126	94.03
Bipolar	2	1.49
Semisteep exterior	5	3.73
Fine exterior	1	0.75

Table 9.6: Mode of backing retouch on AWS48.III trapeze-rectangles

Backing shape		%
Concave	56	31.46
Irregular	1	0.56
Straight and parrallel to opposite edge	81	45.51
Straight and not parallel to opposite edge	37	20.79
Convex	3	1.69

Table 9.7: Shape of backed edge on AWS48.III trapeze-rectangles

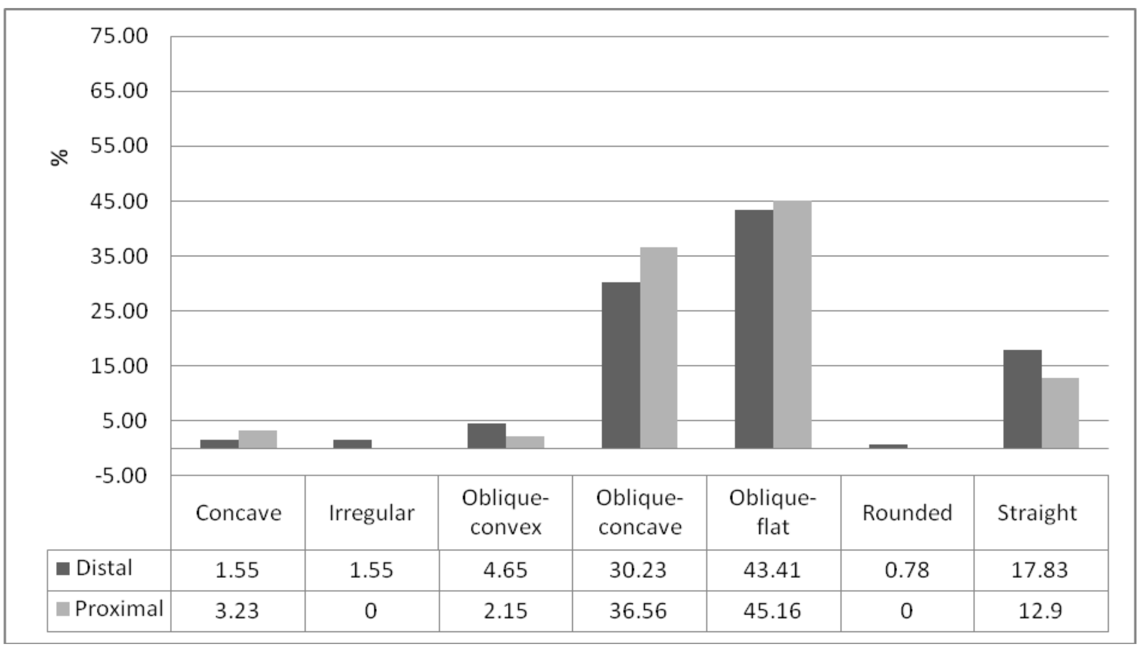


Figure 9.18: Frequency of distal and proximal truncation shapes on trapeze-rectangles at AWS48.III

	#	%
Distal fragment with truncation	172	46.74
Blunt distal fragment	15	4.08
Proximal fragment with truncation	74	20.11
Proximal fragment, no truncation	14	3.80
Medial fragment	89	24.18
Indeterminate fragment	4	1.09

Table 9.8: Types of fragmented microliths from AWS48.III

Location of backing	#	%
Left	200	55.25
Right	162	44.75

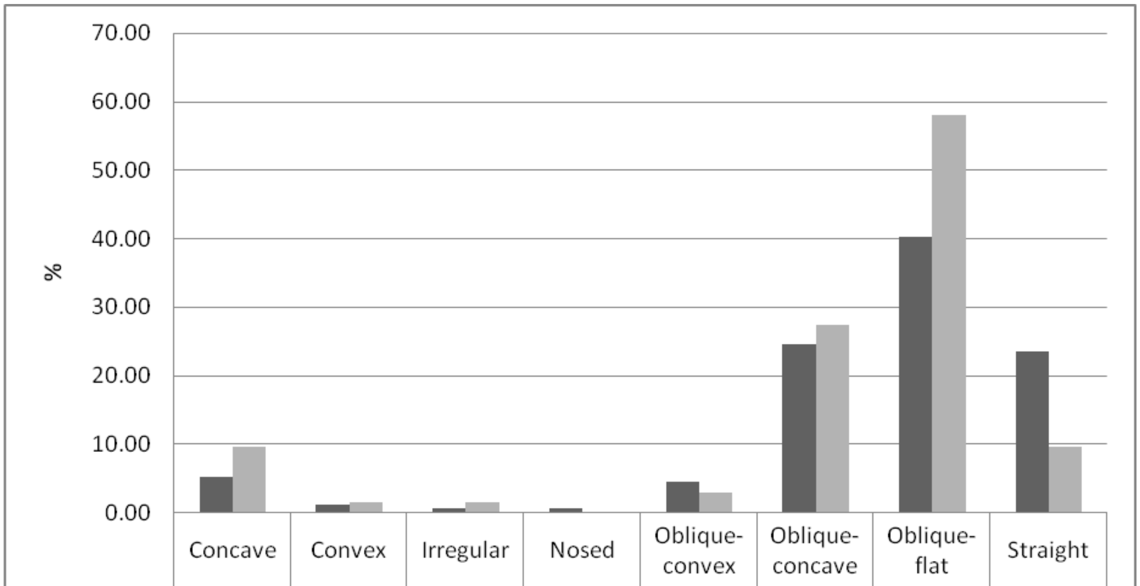
Table 9.9: Location of backed edge on fragmented microliths at AWS48.III

Retouch Type	#	%
Abrupt exterior	331	89.70
Bifacial	1	0.27
Bipolar	7	1.90
Fine exterior	12	3.25
Semisteep exterior	16	4.34
Aprubt interior	1	0.27
Semisteep interir	1	0.27

Table 9.10: Type of retouch amongst broken microliths at AWS48.III

Backing shape	#	%
Straight and parallel to opposite edge	174	48.07
Concave	66	18.23
Convex	15	4.14
Indeterminate	19	5.25
Irregular	6	1.66
Straight and not parallel to opposite edge	82	22.65

Table 9.11: Shape of backed edge on broken microliths at AWS48.III



	Concave	Convex	Irregular	Nosed	Oblique-convex	Oblique-concave	Oblique-flat	Straight
Distal	5.03	1.12	0.56	0.56	4.47	24.58	40.22	23.46
Proximal	9.59	1.37	1.37	0	2.74	27.4	57.95	9.59

Figure 9.19: Frequency of distal and proximal truncation shapes on broken microliths from AWS48.III (Distal: n=179; proximal: n=73)

48 in pre form to be further manipulated as needed, primarily to produce geometric microliths. Core trimming elements are dominated by core face rejuvenation flakes and partial ridged blades. Fully ridged blades are, however, rare. This suggests that initial setting up of cores for blade/bladelet reduction had already occurred prior to the cores arriving on site. The Core Trimming Elements present in the sample only suggest a certain degree of maintenance as core reduction proceeded, but not the initial preparation of platforms or crests required for blade/bladelet removal. Nevertheless, blade/bladelet reduction was highly regularized and resulted in the production of standardized, rounded cores, which utilized the raw material to maximum effect by working the entire circumference of the face of the core. Although flakes are more common than blade/bladelets in the samples discussed here, these appear to result from general core maintenance, rather than from a coherent and independent flake-based *châine opératoire*. This is also reflected in the lack of flake-based retouched pieces, which are rare in the tool sample from all clusters. The focus was clearly on making bladelets for the production of geometric microliths.

Bladelets do not appear to have been sectioned using the microburin technique. There is only one *piquant triedre* in the assemblage and no other typical microburin waste is in evidence. Bladelets therefore seem to have been sectioned by snapping and retouch, rather than employing an anvil. The significant standardization of geometric microliths in the sample is naturally a hallmark of the Geometric Kebaran complex. There is little apparent variation amongst the trapeze/rectangles, which reflects a highly repetitive technological enactment of shape and form. As previously discussed, the high number of fractured trapeze/rectangles in the sample from Cluster 3 is an indicator of the site s likely function. They seems to reflect the repair and maintenance of composite tools as part of short term stays within the same general area of the southern Azraq marshes. How task specific these stays may have been is debatable. Microliths are commonly assumed to have served as components of composite projectile weaponry related to hunting (Bar-Yosef 1987a; Henry 1989, 1995). It has to be borne in mind, however, that multiple use-wear studies have shown that microliths fulfilled a wide range of functions which were not limited to hunting alone. Indeed, trapeze/rectangles specifically have often been linked to cutting or sawing activities, due to the suitability of the unbacked edge and the arrangement of a series of these in hafts (Tomenchuk 1983). Although Shimelmitz et al (Shimelmitz et al. 2004) have also discussed evidence for impact fractures on trapeze/rectangles, the association of the AWS 48 assemblage specifically with hunting is be straightforward. Nevertheless, such an interpretation would make sense bearing in mind the nature of the occupations at AWS 48. As stated previously, these seem to reflect short-term, highly specialized visits characterised by a high degree of composite tool maintenance and repair. Thinking through the possible interpretations for this pattern, it seems reasonable to assume that AWS 48 may have been an area where hunting gear was repaired either prior to or following the stalking of prey in the vicinity.

The AWS 48.III sample discussed here has no immediate comparisons in the Azraq Basin. The known attributes of the geometric microliths from Kharaneh IV phase D (Muheisen 1988a, c, d; Muheisen 1995) contrast markedly with the microlith sample from AWS 48. Kharaneh IV is characterised by a high variability in the distal and proximal shapes of truncations, as well as the form of the backing on trapeze/rectangles; neither features are evident at AWS 48. Indeed, Kharaneh IV appears unusual in comparison to most other Geometric Kebaran sites with respect to the characteristics of the microlith component. Other Middle Epipalaeolithic sites in the Azraq Basin also show a different profile of microlith frequencies. The upper phase of Jilat 22 has a more varied mix of geometric microliths, which include trapeze/rectangles, triangles, lunates and La Mouillah points (Garrard, Baird & Byrd 1994). The latter three are not present at AWS 48. Jilat 8 also has a more varied mix of microliths, including trapeze/rectangles, La Mouillah points, curved pointed and backed bladelets and arched backed bladelets. The lithic assemblage from Jilat 10, although also considered to be Middle Epipalaeolithic, results from an unusual lack of complete formal microliths. It seems therefore that in the Azraq Basin there are no direct parallels to the AWS 48 Geometric Kebaran assemblage.

Casting the view more broadly beyond the Azraq Basin does highlight distinct similarities between the AWS 48 assemblage and other sites in Southern Jordan, the Sinai and Negev, and Central Syria. The high proportion of geometric microliths and the dominance of trapeze/rectangles in lieu of other geometric and non-geometric forms amongst the microlith group is a principal characteristic of assemblages in Southern Jordan referred to as Group II by Henry (1989: 103-104). These sites appear typical of what are today arid settings along the edge of the semi-desert or Mediterranean zone, and the dominance of trapeze/rectangles has been invariably linked to the environmental context of these locations. In Southern Jordan these include the assemblages from J31, J203 (lower) and J201 A and B. In the Sinai and Negev, Mushabi VXII, Mushabi XVIII, Nahal Lavan VI, Nahal Lavan 105, Nahal Lavan II, Lagama N IV, Lagama N VII, Ma'aleh Ziq, D101C and D5, show similar typological profiles (Henry 1989). In Central Syria, the assemblages from Units A and B at Douara Cave also belong to this proposed Group II . The recently excavated site of Uyyun al-Hammam in Northwest Jordan also shares some characteristics in terms of the geometric microlith typology with AWS 48, although the site's assemblage is more diverse than that of AWS 48 (Maher 2005, 2007a, 2001). The Middle Epipalaeolithic assemblage of Wadi Hisban is also comparable to AWS 48, with respect to the shape of the trapeze-rectangles (Edwards 2001; Edwards et al. 1999). The overall composition of this assemblage is, however, once again somewhat different to AWS 48. Indeed, the high frequency of microliths in the AWS 48 sample is unparalleled in other Geometric Kebaran sites. At 81%, only Nahal Lavan 105 has a microlith frequency approaching that of AWS 48. This abundance of geometric microliths in the AWS 48 sample highlights once more the likely task-specific nature of the site.

Chapter 10: The Epipalaeolithic Landscape of the Azraq Basin

INTRODUCTION

Fieldwork at Ayn Qasiyya and AWS 48 has provided us with a broadened understanding of the Epipalaeolithic occupation of the Azraq Oasis and the basin as a whole. In addition to Azraq 17, Ayn Qasiyya is the only comprehensively excavated Early Epipalaeolithic site in the Azraq Oasis, although other sites are known (including Azraq 32, the Early Epipalaeolithic site at Ayn Soda and recently discovered Early Epipalaeolithic artefacts in the former marshland of Azraq ed-Druze). AWS 48 is the only clear example of a Middle Epipalaeolithic occupation in the area. Furthermore, Ayn Qasiyya is at present the only site in the southern Levant, which has produced evidence for both the Nebekian and Kebaran lithic industries at a single locality. The discovery of a semi-articulated set of human remains at Ayn Qasiyya heralds the only second burial of this date in Jordan, and is the only eight complete individual from the Late Upper Palaeolithic to Early Epipalaeolithic time frame (Nadel 1995: 2-3). The series of AMS dates from Ayn Qasiyya produced tightly clustered results which suggest a very early date for the Kebaran industry at the site. Similar industries dominated by obliquely truncated and backed bladelets have often been considered to dominate the late Kebaran (Bar-Yosef & Vogel 1987), and indeed succeed a previous Kebaran phase at Kharaneh IV (Muheisen 1988a, d). However, compared with radiocarbon dates for other early Kebaran assemblages, the Ayn Qasiyya dates appear to be significantly older. This may lead us to reconsider the strict separation of Kebaran assemblages into distinct early and late varieties (Hovers & Marder 1991). Either what has previously been considered 'early' and 'late' Kebaran assemblages overlapped more than previously assumed, or the Kebaran occupations in the Azraq Basin are significantly older than in the western Levant. Future radiometric dating of the stratified succession of 'early' and 'late' Kebaran industries from Kharaneh IV should help to clarify this issue. The distinctiveness of the Kebaran assemblage from Ayn Qasiyya with respect to the dominance of obliquely truncated and backed bladelets can also be highlighted. Edwards (Edwards 2001; Edwards et al. 1996) has suggested that these may represent an East Jordan Valley subgroup of the Kebaran, distinct from other assemblages in the western Levant. AWS 48 and Ayn Qasiyya therefore provide an opportunity to re-examine the archaeology of the Azraq Basin under the aegis of a practice theory framework, and to discuss the applicability of the geographical dichotomy between Mediterranean core and more arid peripheries. Due to the different nature of the evidence produced as part of this study, Ayn Qasiyya will play a somewhat more prominent role in this discussion than AWS 48.

ENVIRONMENT

The geomorphological and palaeoenvironmental evidence collected as part of the excavations at Ayn Qasiyya shows that a lacustrine setting was prevalent prior to the occupation of the site. A ca. 50 cm-thick series of lake marls, showing several episodes of lake recession, was documented in Section 1 and 4 at Ayn Qasiyya. AMS dates from the lower level of the marsh deposit (Unit II) suggests that pedogenesis began at around 21,000-20,000 cal B.P. (see chapter 6,; Jones et al. forthcoming; Richter et al. forthcoming). This places the development of the marsh at Ayn Qasiyya into the later part of the Last Glacial Maximum. The occurrence of pedogenesis at the site at this time indicates the presence of wet conditions and likely active springs at Ayn Qasiyya. Other Early Epipalaeolithic sites throughout the Azraq Basin indicate a very similar pattern (see chapter 5, Byrd 1989; Byrd & Garrard 1989; Garrard 1998; Garrard, Baird & Byrd 1994; Garrard et al. 1988). Pedogenesis was observed in the basal layers of Jilat 6, and in deposits associated with the Early Epipalaeolithic industry of Wadi Uweynid 14 upper phase. Substantial clay deposits were also noted beneath the earliest occupation at Kharaneh IV (Muheisen 1988a; d; Maher forthcoming; personal observation August 2008). This data strongly suggests that the LGM was associated with generally wetter conditions during the last part of the LGM in the Azraq Basin. These moist conditions likely indicate extant bodies of water, such as wet and marshlands, at multiple locations throughout the Azraq Basin. Their presence does not necessarily indicate that climatic conditions were not generally cold and dry. Indeed, cooler temperatures can be expected to result in lower evaporation rates, which in turn contributed to water remaining in the environment (Cordova 2007). It is unclear in how far one should regard this pattern as a seasonal occurrence in which the existence of seasonally appearing flooded areas was prolonged longer than today, or whether these were year-round conditions. In the case of the oasis it seems fairly clear that the springs provided a reliable source of water year-round (Macumber 2001), but further work is required to verify the status of similar conditions at Kharaneh IV and Jilat 6.

In either case, the palaeoenvironmental evidence indicates that the Azraq Basin provided suitable conditions for occupation throughout the Early and Middle Epipalaeolithic. But, it also shows that overall climatic and environmental models need to be contextualized against local palaeoenvironmental and archaeological datasets. Although macro-scale climatic models predict that cool and dry climatic conditions prevailed (Cordova 2007; Rosen 2007), the idea that this resulted in a straightforward expansion of deserts and steppic zones due to hyper-aridity appears only partially accurate. The sedimentological evidence from Epipalaeolithic sites in the Azraq Basin indicates that local conditions were much more amenable to human groups than predicted in a three-zone phyto-geographical model, which is largely based on modern predictions rather than concrete plant evidence in any case. Multiple wet- and marshland locations in the Azraq Basin provided a reasonable basis for establishing settlement in the region and appear to have drawn in communities with connections as far afield as Southern Jordan and the Mediterranean Coast.

Given this evidence, it therefore seems a fallacy to argue that one should consider the Azraq Basin and the today semi-arid and arid zone as marginal. Direct palaeoenvironmental evidence, gathered as part of multiple field projects in the region, shows that local environmental conditions were not as severe as has often been stated. It follows that survival in the Azraq Basin was not as difficult to manage as macro-scale climatic predictions appear to dictate. The data instead paints a much more diverse picture of likely semi-seasonal to permanent marshlands that provided a habitat for a multitude of animal and plant communities. These, in turn, provided multiple opportunities for food procurement. Wet- and marshland settings have for a long time been associated with providing ideal conditions for hunting and gathering communities (Nicholas 1998). In Southwest Asia, especially, they have been the focus of much attention, for example in the Wadi el-Hasa (Coinman 1998; Coinman 2004; Coinman et al. 1986; Olszewski 2000; Schuldenrein 1998; Schuldenrein & Clark 1994, 2001), in the el-Kowm Basin (Cauvin 1987/8; Cauvin et al. 1979; Cauvin 1981; Cauvin & Couqueugniot 1988; Molist 1992; Molist 1990; Tensorer et al. 2007), or the Huleh Basin (Valla 1995). The importance of marsh and wetland settings is amplified when we consider rates of mean annual primary production of biomass in different ecosystems. Although no specific data is available for the Azraq Oasis today, the net primary production of marshlands is estimated at 9,000 kilocalories/ square meter per year (Pidwirny 2006). This places marshlands on the same level as tropical rainforests and estuaries. By comparison, deciduous temperate forests are estimated to have a mean annual primary productivity of 6,000 kilocalories/square meter per year (Pidwirny 2006). This highlights how critically important marshlands in general would have been to sustain human populations. While the zone of deciduous forest vegetation, i.e., the Mediterranean woodland zone, would have covered a much larger area in the southern Levant than the marshlands in the Azraq Basin at any given time, it is nevertheless clear that the local ecological conditions would have provided a much higher rate of primary biomass productivity than is accounted for by a general palaeoclimatic model that postulates hyper-aridity. This would also result in a higher carrying capacity for the local environment. Local variation in ecology and geography played a critical role in creating a unique ecosystem and habitat in the Azraq Basin on which human groups were able to rely. The Azraq Oasis at least would have also been resilient against adverse changes in climate, due to the delayed discharge of its aquifers (Macumber 2001). This may not have been true, however, for other non-spring-fed marshes and wetlands in the basin. For example, no ancient springs have yet been located in the vicinity of either the Wadi el-Jilat or Kharaneh IV. Nevertheless, environmentally the Azraq Oasis in particular, and the Azraq Basin as a whole can be considered a highly productive and ecologically-rich environment during the Early and Middle Epipalaeolithic. Local environmental conditions do not match equivocally with large-scale palaeoenvironmental reconstructions. This should prompt us to reconsider how we understand this landscape with respect to the wider region. The evidence both from the intensive human occupation of the Azraq Oasis and its hinterland, as well as from palaeoenvironmental data shows that this was not a marginal zone at all, but a diverse and rich environment that facilitated intensive and sustained occupation.

SITUATED LEARNING AND SOCIAL GROUPS

Chipped stone artefacts constitute the bulk of direct archaeological data from Ayn Qasiyya and AWS 48, and an understanding of how they relate to human practice is imperative to consider how communities in the Azraq Basin interacted with each other, the landscape and the changing environment. I have previously situated the study of the chipped stone assemblages within a *chaîne opératoire* context and, in turn, have related this heuristic principle to practice and agency theory (see chapters 3 and 4). Having discussed the nature of the lithic assemblages from Ayn Qasiyya and AWS 48 throughout chapters 8 and 9, I now intend to reunite these themes by considering how the patterned similarity and variability between these assemblages can be interpreted.

At Ayn Qasiyya, close analysis of the lithic assemblages revealed both a certain degree of parallels, as well as minute differences between the samples analysed from Area A/B and Area D. Although flakes are more common in both industries, they are nevertheless predominantly geared toward the production of bladelets used in the manufacture of non-geometric microliths. Thus, they both exist within the broader Epipalaeolithic continuum of a dominant microlithic production. The differences between the assemblages are partially obvious, but some are more minute. The most obvious difference is the use of raw material. In Area A/B mid- to dark-grey and black flint dominates, whereas a light, yellowish-brown flint was predominantly used in Area D. This not only likely reflects differences in preference, but also how people moved around the landscape, understanding where suitable raw material could be obtained, and how the knowledge and memory of these places connects to what one might call planned strategies of raw material exploitation. It may also relate to regulations concerning access to particular raw material sources. It is not uncommon to find that access to precious or high quality stone sources is socially restricted. Cosmological or kinship relations may play into channelling these social conditions (Gould 1980; Hampton 1999; Taçon 1991). On a purely technological level, although core shapes and characteristics are remarkably similar between Areas A/B and D, detailed technological analysis revealed potential differences in the reduction sequence between the assemblages. Production of blades/bladelets appears to have occurred at a later stage in the sequence in Area D, than in the Area A/B assemblage. This attested to by the frequency of different types of core trimming elements in both samples. An examination of the butts of blade and bladelet debitage suggests that subtle differences exist in knapping techniques when bladelets were detached from cores in Areas A/B versus Area D. This seems to be supported by the frequencies of ridge blades and core tablets. Turning to the production of microliths, further significant technological differences between the two assemblages were noted. Whereas the microburin technique was not used to section bladelets in Area A/B, it was very common in Area D. This minute, yet important, difference is a defining characteristic of the two early Epipalaeolithic industries, the Kebaran (no microburin technique) and the Nebekian (microburin technique). Lastly, differences in the typological composition of the microlith groups were noted. This difference, obliquely truncated and backed bladelets in Area A/B versus curved pointed and backed bladelets and arched backed bladelets in Area D also mirrors the differences between the Kebaran and Nebekian industries.

To one degree, one could argue that the techno-typological differences between the Area A/B and Area D assemblage at Ayn Qasiyya are miniscule and that this pattern may be more related to the recovery and sampling strategy, the techno-typological classification system or a combined bias resulting from both. However, the combination of the results obtained from the Ayn Qasiyya sample, which depend on independent variables, clearly shows incontrovertible differences between the assemblages from Areas A/B and D. The clearest difference is the use of the microburin technique in Area D and its virtual absence in Area A and B, which reflects a pan-Levantine, geographically-consistent pattern during the Early Epipalaeolithic (microburin-poor assemblages in the West and microburin-rich assemblages in the East, see Belfer-Cohen & Goring-Morris 2003; Byrd 1998; Goring-Morris 1995; Goring-Morris & Belfer-Cohen 1998; Goring-Morris et al. 2009; Henry 1995; Olszewski 2001b, 2006; Stutz & Estabrook 2004). The obvious question becomes how can this variability be explained? Different researchers have put forward different concepts and interpretations for early Epipalaeolithic lithic variability. At present, Ayn Qasiyya seems to represent the only site at which characteristics of the two generally-recognised industries, Kebaran and Nebekian, occur at the same place. This provides critical new data for our understanding of the nature of this variability. What implications does this pattern hold for our understanding of these lithic industries within the Azraq Basin and beyond?

The first implication might be to suggest that the observed variability is diachronic in character, reflecting gradual technological change over a long period of time. At present, the stratigraphic relationship between Area A/B and D are not directly demonstrated through excavation. It is therefore difficult to correlate the two assemblages. Nevertheless, geoarchaeological study of the deposits shows that the site-formation processes are highly correlated between the three trenches. The excavation areas share the basic stratigraphic succession (lake marls, marsh deposits, carbonate concretions), so that the assemblages can be placed into broadly the same time horizon of sedimentological events. However, it is unclear how much time is actually compressed in this sequence. Soil formation in such a waterborne environment is likely to have occurred relatively rapidly (Breemen & Buurman 2002), although this easily encompasses multiple human generations. The available radiocarbon dates from Kebaran and Nebekian sites across the southern Levant (Byrd 1998; Byrd 1994b; Goring-Morris & Belfer-Cohen 1998) suggest that the two industries are broadly contemporary, and most scholars consider the Kebaran and Nebekian as congruent technological complexes existing side by side in separate geographical settings (Byrd 1998; Byrd & Garrard 1989; Garrard 1998; Garrard & Byrd 1992; Goring-Morris & Belfer-Cohen 1998; Goring-Morris et al. 2009; Henry 1995; Schyle & Uerpmann 1996), although the Nebekian appears earlier, while the Kebaran continues longer into the final Pleistocene. A further indication for a broadly contemporary existence of both the Kebaran and Nebekian is that we do not seem to have any sites at which the two industries occur in the same stratified sequence. In fact, their general spatial separation into east and west is one of their defining characteristics. In this sense the Azraq Basin, in general, and Ayn Qasiyya, in particular, emerge as highly interesting areas to consider the nature of these lithic industries and the potential for interaction between their practioners, which I aim to discuss further below. For these reasons I consider the two discussed assemblages as broadly contemporary.

If we assume then that the two assemblages belong to a broadly contemporary time horizon can the techno typological differences be explained on the basis of different adaptive needs by Early Epipalaeolithic hunter-gatherers using the oasis? This particular suggestion forms the basis of Neeley and Barton's (1994) argument that mobility patterns, re-sharpening of microliths, raw material availability, and raw material constraints are the underlying causes of techno-typological variability in the Epipalaeolithic. Bearing in mind the substantial critiques put forward against their model (Fellner 1995b; Goring Morris 1996; Henry 1996; Kaufman 1995; Phillips 1996), further points of observation with regards to Ayn Qasiyya can be made. The Azraq Oasis has been described as a very stable and reliable ecological zone within what could be termed a more high risk semi-arid to arid zone of the Levantine periphery (Macumber 2001: 11-13). The self-sustaining system of copious springs was, until modern interference, a remarkably resilient and stable resource. Water pumped from the oasis aquifers today is 20,000-4,000 years old (Froehlich et al. 1987; Karabsheh 2000), which indicates the minimal length of discharge to recharge in the springs. We have little reason but to believe that this system is of some antiquity. As outlined in chapter 5 and 6, and earlier in this chapter wet- and marshland settings existed at numerous localities throughout the Azraq Basin (Garrard et al. 1988; Garrard 1998; Macumber 2001). These provided a critically important resource base for human communities, attracting abundant wildlife and providing a basis for a diverse plant community. Given that the oasis represented a stable micro-environment in the face of wider climatic and environmental change, it is difficult to see how hunter-gatherer groups should have had a need to develop different kinds of adaptive toolkits in this environment.

A second point of objection to a functional hypothesis in the case of Ayn Qasiyya is that there is very little difference in the technological aspects of the two assemblages, apart from microburins, the subtle differences between knapping techniques, and microlith typology. Although different raw materials were used there is no need to assume that either raw material required a more maximising core reduction strategy. In all three areas, standardized single-platform bladelet cores - which utilised the narrow faces of relatively flat nodules - are common. Although there are some differences in the overall reduction sequence and production of blade/bladelet blanks, these cannot be seen to have provided adaptive advantages or disadvantages. Instead, the techno-typological differences appear to be minute. Ayn Qasiyya therefore falsifies the functional hypothesis put forward by Neeley and Barton (1994).

The majority of researchers have tended to interpret the variability in final Pleistocene microlithic toolkits and their associated manufacturing sequences as cultural differences, on which social groups can be identified (Bar-Yosef 1991; Bar-Yosef 1998; Fellner 1995a, b; Goring-Morris 1995; Goring-Morris 1996; Goring-Morris & Belfer-Cohen 1998; Goring-Morris 1987; Henry 1989, 1995, 1996; Pirie 2001, 2004). Some have suggested that these differences are not only social, but also reflect the primordial ethnicities of these groups (Bar-Yosef 1991: 372, 381-384; Henry 1989: 170-175; 1995: 420). This perspective is often linked to the idea that the spatial distribution of these industries displays a separation that conforms to ideal forms of ethnographically-known hunter-gatherer territories and foraging ranges (Henry 1989: 175). On the face of it this seems to make sense for the Azraq Basin: different sites situated apart from each other and nested within their respective ecological context have different microlithic toolkits. Kharaneh IV and Jilat 6 are characterised by Kebaran-style and Nebekian-style toolkits, respectively, and are situated within distinct ecological zones. Being ca. 35 km apart they may well represent two places within specific exploitation areas of socially distinct groups. Smaller sites, such as Uweynid 14/18, may represent task-specific or short-term seasonal satellite camps that operated as part of a wider radial settlement pattern. According to this view, differences in the lithic toolkits reflect different mental templates which themselves relate to social group boundaries and identities. The spatial separation of these differently constituted techno-typological complexes clearly is key to consider them as some kind of expressions of separate socio-cultural groups. The underlying narrative, however, is one related to social evolutionary principles. Different ethnic identities are said to alleviate risk by fostering collaboration or maintaining strict group allegiances (Henry 1995: 420-421). In the case of Ayn Qasiyya, however, this separation does not seem to apply, as both industries occur within the same space. It is possible to argue that this matters little, since the boundaries of hunter-gatherer territories may have shifted over time and that different groups occupied Ayn Qasiyya at different points in time.

However, it is important to be aware that the linking of certain aspects of material culture with the more ephemeral concept of social identity, and specifically ethnicity, is not straightforward and certainly difficult to make. This is especially the case in the Azraq Basin, where the lack of more comprehensive surface surveys does not provide near total coverage. This necessarily places limitations on our understanding of the spatial distribution of sites. Various scholars have problematized this essentially cultural-historical approach and have challenged the link between material culture style and cultural identity or ethnicity, and have criticised a conceptualisation of cultural or ethnic identity as representing static cultural norms (Hodder 1982c, 1986; Jones 1997; Kohl 1998; Sackett 1982, 1985, 1990; Trigger 1995). Hodder (Hodder 1982b), in particular, has shown that the material symbols involved in signifying and negotiating ethnic identities can vary from one group to another. Wiesner's (Wiesner 1983) classic study of style in !Kung San projectile point styles and their links to ethnicity are used in the Epipalaeolithic Levant to infer a connection between style and ethnicity (Henry 1989: 167-175) has also been critically reviewed (Sackett 1995). If the ethnographic record is anything to go by, then we must acknowledge that while ethnicity may at times correspond with material culture traits, at others it may not. In addition, we simply do not know what material symbolism may have been involved in creating and maintaining ethnic or cultural identities in the Epipalaeolithic Levant. Having said that, what seems nevertheless intriguing about the Ayn Qasiyya assemblages is that they do appear to reflect the long term maintenance of differently constituted technological habits, which cannot be explained by functionality alone. Both microburin-rich and microburin-poor assemblages co-existed for a long span of time next to each other in mostly separate locations in the Azraq Basin. There seems no other way to explain this except to understand these differences as the result of diverse technological traditions. Yet, how do we conceptualise such traditions? Rather than suggesting that they reflect something akin to ethnicities or archaeological cultures, I would like to suggest that these technological habits reflect the minutiae of different sets of learned practices.

If we accept that the observed variability reflects different technological choices made by prehistoric flintknappers on how to make bladelet blanks and how to shape microliths then these differences are hardly representative or useful in displaying stylistic choices. I have shown in chapter 8 the minute differences in technology and typology between Areas A/B and D at Ayn Qasiyya. Modern-day archaeologists can easily forget that the data they attribute considerable meaning to today – because they consist of the majority of the material remains available for study – may not have been considered that important by final Pleistocene hunter-gatherers. Preservation conditions of the archaeological record precondition us to think that lithics must have had an all-encompassing importance, but we must not forget how they were undoubtedly integrated with a wider set of organic, and therefore perishable technologies (e.g., wood and bone handles, sinew, bitumen and other kinds of glue, animal skins, feathers, etc.). However, experimental chipped stone reproduction and ethnographic evidence indicates that the particular choices made by flintknappers reflect conscious decisions that allow us to separate the products of these technological acts into different analytical categories. It seems to me then that the presence or absence of the microburin technique, differences in the gestural application of different reduction techniques and differences in the nuances of microlith typology are socially conditioned, since such human choices and activities do not occur within a social vacuum, but are always socially mediated (Dobres 2000; Edmonds 1990; Ingold 1996, 2000; Lemonnier 1986, 1989, 1990; Pfaffenberger 1992).

I would like to suggest then that a crucial concept here, which requires more direct attention, is the process of learning. Current theories of learning offer a complementary perspective on chipped stone techno typological variability, which can allow us to go beyond the functional versus cultural dichotomy. Conventional definitions of learning, such as those encountered for example in evolutionary archaeology (Shennan 2002; Tehrani & Riede 2008), assume that learning is a process that relates directly to individuals, that it is a formal process, separate from the rest of our activities and results from formal teaching (Wenger 1998: 3). It is also conceptualized primarily as a straightforward and unambiguous transmission of knowledge from one generation to the next. This knowledge transmission is seen as governed by natural selection, in which traits enabling populations or cultures to thrive are passed on, while others are abandoned. In contrast to this view, Lave and Wenger (Lave & Wenger 1991) argued that learning is instead more directly connected to practice and the formation of individual identities. Through practice, they argue, identities are shaped as part of people's participation in particular communities in which learning is enabled. They referred to these communities as *communities of practice*, which are defined on the basis of their joint enterprise they engage in. Communities of practice are considered self-organizing social systems that centre around common goals, aspirations and tasks, but they do not have to correspond to normative social groups, as defined through ethnicity, kinship, culture or nationality. Instead, they are solely centred around practice and exist through and because of their mutual engagement in a practice (Lave & Wenger 1991; Wenger 1998). As part of their joint enterprise and through their mutual engagement members of a communities of practice have to draw on a shared repertoire, through which the meaning of their enterprise and their engagement is negotiated in practice. This repertoire includes both tangible objects and intangible concepts. Importantly, Wenger (Wenger 1998) explicitly includes artefacts among the tangible items that make up such repertoires (Figure 10.1). This provides a direct connection to archaeology, and links in with archaeologists' recent engagements with social technologies and the *châine opératoire* (Dobres 2000).

A critical element of these communities of practice is that as humans their members' life span is restricted. To sustain a community's joint enterprise and thereby its continued existence it is required that new members are admitted to the community. This process is intricately connected to learning. Lave and Wenger (Lave & Wenger 1991) chart this learning process as a progression of the learner from the periphery towards the centre of the community.

"Learners inevitably participate in communities of practitioners and the mastery of knowledge

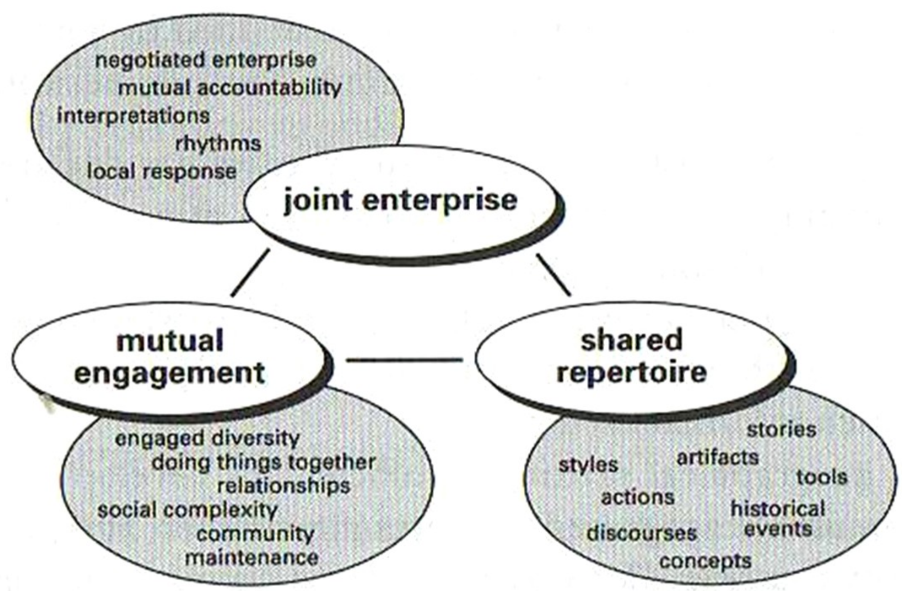


Figure 10.1: The three defining characteristics of a *community of practice*. (After Wenger 1998: 23)

and skill requires newcomers to move toward full participation in the socio-cultural practices of a community. Legitimate peripheral participation provides a way to speak about the relations between newcomers and old timers, and about activities, identities, artefacts, and communities of knowledge and practice. A person's intentions to learn are engaged and the meaning of learning is configured through the process of becoming a full participant in a socio-cultural practice. This social process includes the learning of knowledgeable skills." (Lave & Wenger 1991: 29)

As members join a community their learning establishes social relationships. Through engaging with other members, defining and redefining the community's practice, they actively shape their personal identity in relation to the group's joint enterprise. Mutual engagement and the shared repertoire enable this process of learning, and are equally important in shaping members identities. New members' learning is firmly situated in practice to the extent that they are indistinguishable. For Lave and Wenger (Lave & Wenger 1991), there is no beginning or end to learning. It takes place constantly and is not restricted to formal learning occasions. Wenger has summed up this concept as follows:

> Being alive as human beings means that we are constantly engaged in the pursuit of enterprises of all kinds, from ensuring our physical survival to seeking the most lofty of pleasures. As we define these enterprises and engage in their pursuit together, we interact with each other and with the world and we tune our relations with each other and with the

world accordingly. In other words we learn. Over time, this collective learning results in practices that reflect both the pursuit of our enterprises and the attendant social relations. These practices are thus the property of a kind of community created over time by the sustained pursuit of a shared enterprise. It makes sense therefore to call these kinds of communities *communities of practice* (Wenger 1998: 45).

Wenger's perspective has much in common and is heavily influenced by practice and agency theory. We can understand communities of practice as being in some sense equivalent to Bourdieu's *social field*, with the building of the *habitus* representing the learning process (Bourdieu 1977, 1990). Indeed, Bourdieu talked at length about the process of socialization and how people become unconsciously accustomed to specific social fields. Giddens likewise discussed socialization and the repeated reiteration of social structures in his work (Giddens 1979, 1984). Although Wenger's work in particular draws a lot of inspiration from these works, he foregrounds learning to understand how social groups organize themselves and how they maintain their coherency over time (Wenger 1998). This complementary perspective has a lot to offer to archaeologists, since it links material culture, learning and practice, with the creation of identities in the context of intra- and inter-group social interaction with a time perspective. Wenger stressed the importance of learning and socialization, as well as material reproduction, in the maintenance of the coherency of a community of practice. There is an internal logic to the self organization of these communities and their maintenance, which centres on learning.

If we disregard other explanations for the underlying variability in Epipalaeolithic lithic assemblages, as I have outlined above, can we utilize situated learning to understand the formation, maintenance and change of lithic assemblages in the Azraq Basin and beyond? As part of the description of the *châine opératoire* in chapters 8 and 9, I have outlined how different gestures and techniques were involved in creating the different characteristics of the Ayn Qasiyya Area A/B and Area D lithic assemblages, as well as the AWS48.III lithic material. I argued that functional or normative cultural frameworks appear inadequate to explain these differences. They simply do not afford adaptive advantages and neither do we have sufficient data to suggest that they relate to ethnic groups. However, I have previously discussed an understanding of technologies as social products, shaping and being shaped by the social contexts in which humans enact them (see chapter 3 and 4). While there has often been a focus on how technologies can be used to facilitate social change, the emphasis is here on homogeneity and reinforcement of existing social structures. What we can see in the Ayn Qasiyya assemblages, in particular, and the Azraq Basin assemblages, in general, is long-term continuity in the intricate ways of producing blanks for microliths, and how to fashion them into the desired end-product. These particular ways embody practical knowledge and this knowledge was learned and passed on from one generation to the next to fulfil a joint enterprise within communities of practice. They represent patterns of actions that have been observed and copied by members engaging in a joint enterprise. The patterns identified through technological and typological analysis thus represent palimpsests of the shared histories of learning enacted within these communities, and thus help us to reconstruct the social conditions under which they came into being.

This is not to say that these communities of practice are a substitute for culture groups or ethnic communities. This is because we very probably are looking only at a miniscule part of the past technological system. It cannot be ascertained whether these shared histories of learning corresponded with wider frameworks of referencing individual and group identities, such as ethnicity, kinship, or cosmology. While communities of practice have boundaries that are well defined through practice (Wenger 1998), they are not mutually exclusive. Individuals are more often than not members of multiple communities of practice of various kinds. Communities come into being and vanish according to the need of defining and negotiating emerging practices. What is intriguing, however, is the longevity of the shared histories of learning attested to by the lithic assemblages from the Epipalaeolithic in the Azraq Basin. What we witness here is reinforcement, recreation and maintenance of technological practices over the course of multiple generations, with change in material culture only happening very gradually. These social structures that engrained learning and practical knowledge were persuasive and not easily challenged or changed by individual agents. While these communities are not mutually exclusive, we can nevertheless consider other aspects of their interaction and constitution. These resolve around other material items and how these communities operated in space. Communities of practice operate in particular loci, which facilitate learning, mutual engagement and the creation of shared repertoires (Wenger 1998). It is in these loci that communities' joint enterprises are defined, contested, negotiated and implemented. It is to the constitution, creation and characteristics of these places, as well as to the relationship between these different social communities, that I will turn my attention to now.

CREATING PLACES

Recent research into the emergence of sedentism, agriculture, and village life, has shifted away from a unilateral focus on environmental and climatic causes, towards a more complex scenario based on intertwining social, cognitive and cultural processes. This shift has also incorporated the realisation that the emergence of the Neolithic may have been a much more gradual and drawn out process that originated in the Palaeolithic, rather than a more sudden, punctuated development. This does not necessarily mean that one has to allude to a social evolutionary narrative to describe this process, but it is nevertheless important to discuss how social changes during the earlier Epipalaeolithic relate to the emergence of the Neolithic, in particular with regards to the final Pleistocene of the Azraq Basin. Hodder (Hodder 2007) has recently insightfully discussed the parameters of this long and drawn out process, which he considers to be centred on "…a changed relation to time and history. Rather than immediate and short-term relationships, societies in the region developed a strong sense of temporal depth tied to specific places before domesticated plants and animals emerged" (2007: 108). Although Hodder considers this process to be rooted in the Upper and Early Epipalaeolithic, the emergence of stone architecture during the Natufian is nevertheless seen by him to be a critical step in the reiteration of social and ritual life and this socialisation process. Trevor Watkins (2005) has highlighted this particular issue with regards to the emergence of the house and home and the symbolic force that is inherent in it, while also stressing that its antecedents ought to be sought in the Epipalaeolithic. This somewhat follows Cauvin's (1978, 1994, 2000) original outline of the 'Neolithic Revolution' as a fundamentally social and symbolic transformation, related to the emergence of symbolism and religion. Although both Hodder and Watkins stress the importance of the pre-Natufian Epipalaeolithic their sight remains firmly locked onto the Natufian as the time period in which the construction of memory through the construction of houses became fully articulated. It is somewhat surprising, however, that neither take into account the evidence from the Azraq Basin in particular, as well as other localities (Cauvin 1987/8; Cauvin et al. 1979; Cauvin 1981; Cauvin & Couqueugniot 1988), where very large sites attest to the articulation of precisely these processes. Kharaneh IV is a site of an unprecedented scale with evidence for the repetitive occupation of a particular locality over the course of millennia. This is attested to by the superimposition of fine occupation surfaces intermingled with refuse deposits that constitute a stratigraphic sequence at least 1.3 m in thickness (see chapter 5, Figure 5.10 and 10.4). In the case of Wadi Jilat 6 it appears that the earlier phases were not characterised by such an intensive or large occupation. Although the precise size of the occupation area is unknown for the early and middle phase of Jilat 6 due to the nature of the excavations at the site, finds densities are low compared to the upper phase and Kharaneh IV. The occupation sequence is also characterised by occupation deposits interspersed with sterile sediment, which suggests that the site was less frequently visited (Garrard et al 1994). Only during the latest phase of does Jilat 6 attain a large horizontal extent approaching ca. 17,000 m^2. Nevertheless, it seems to me that here we have ample evidence to explore the origins of peoples' changed relationship to space, places and landscapes, and it is to this that I want to turn my attention now.

Having situated the lithic assemblages from Ayn Qasiyya and AWS 48 as a product of the shared histories of learning of communities of practice, it becomes possible to consider how these communities shaped their landscapes socially, with respect to the physical environment. I previously noted how the spatial distribution of lithic industries represents a peculiar pattern in the Azraq Basin. Although we now have a considerable database of sites from the Azraq Basin, it is important to remember that our understanding of the spatial distribution of these sites is somewhat biased. This is because survey coverage in the region has to date not been exhaustive. Although many wadis, mudflats and the central Azraq Oasis have been surveyed, our knowledge about the number and location of other final Pleistocene sites in the region remains as yet incomplete. Nevertheless, the data currently available provides a good insight into elements of the spatial set-up of the Azraq landscape, with 'mega-sites' to be found away from the oasis in tributary wadis and shallower, smaller sites to be found near or in the oasis. It is unlikely that even further intensive survey would challenge this basic picture, although it is possible that future work might discover another Jilat 6 or Kharaneh IV somewhere in the region. Be this as it may, we have to accept the current state of the available data and attempt to build our understanding of the regional settlement pattern and use of the landscape on it. Bearing these limitations in mind it is especially noticeable that a Nebekian style lithic industry can be found in the Wadi el Jilat and the Wadi Uweynid, whereas a Kebaran industry was found at Kharaneh IV. Kharaneh IV, and Jilat 6 during its later phase, can be easily understood as aggregation sites or base camps operating within a logistical settlement pattern, in which Uweynid 14/18 and other smaller sites would correspond to specialised, short term satellite camps. This apparent settlement dynamic is even more intriguing given that two diverse sets of lithic material culture were used by the inhabitants of these sites. Understanding this material repertoire as generated within communities of practice allows us to consider the differentially situated social processes apparent in both groups in the construction of space (Hodder 2007).

Before turning my attention to Jilat 6 and Kharaneh IV, however, it is important not to privilege these sites against other, more ephemeral localities in the Azraq Basin. Here, I would like to return to Ayn Qasiyya and AWS48. The archaeological signatures of these two sites provide not only some temporal depth that suggest changes in the physical use, but they also show changes in the way in which people socially constructed places through their engagement with the physical world and through their practices. Not only did Early and Middle Epipalaeolithic groups occupy different parts of the Azraq Oasis, but the characters of the occupation also differ considerably. While early Epipalaeolithic, and seemingly Late Epipalaeolithic, communities chose to situate their camp next to the copious springs, Middle Epipalaeolithic groups at AWS 48 occupied the south of the marshland in vicinity to the modern *Qa*. Deposits at Ayn Qasiyya are up to 1 m thick and suggest a substantial accumulation of archaeological material and sediment in one location, while AWS 48 is a much more dispersed site with multiple dense clusters of surface artefacts with limited depth of deposition (10-15 cm). It seems that the former either represents the re-occupation of a very particular spot in the landscape over at least some extended periods of time or the presence of sizeable groups occupying this location on more than one occasion. At AWS 48, occupations clearly have a short term character, although they also re use a particular, less circumscribed, landscape location. It is of note here that the entire Ayn Qasiyya sequence does not attest to any Middle Epipalaeolithic occupation, despite being occupied earlier and later. Why did this apparent shift in settlement focus away from the springs toward the southern silt dunes occur? It is possible that spring flow shifted laterally across the oasis, although no spring deposits are associated with the area surrounding AWS 48. The retouched lithic assemblage from AWS 48 is much more restricted than that of Ayn Qasiyya, where more non-microlithic artefacts are present (see chapter 8 and 9). This may indicate that AWS 48 was a special purpose site, more directly associated with hunting and the manufacture and maintenance of hunting gear. Thus, we are looking at a more specialised series of very short term campsites that exploited the vicinity of various water sources (the marshes to the north and potentially a seasonal *Qa* to the south and east). The area would have likely provided ideal opportunities for specialized hunting parties to visit the oasis and prey on game that would have been particularly attracted to the oasis during particular times of the year. Although we do not have direct faunal evidence from AWS 48, gazelle was a preferred game species throughout the Epipalaeolithic (Bar-Oz 2004; Martin 1994). It is therefore possible to think of a scenario in which subtle shifts in settlement pattern toward a more flexible system of short-term, specialized camp sites aimed at exploiting the wetlands and *Qa* for intensive hunting of gazelle. In contrast, the Early Epipalaeolithic at Ayn Qasiyya was associated with a more generalised system of camps that resulted in more substantial depositions of material culture. Unfortunately, data on the seasonal use of the Azraq marshes is as yet not available. Although faunal remains from the site have been examined (Richter et al. forthcoming; Thorne 2008), further work on the faunal material – especially the remains of numerous bird species from Ayn Qasiyya – is required to permit a discussion of seasons during which the site may have been occupied.

Thorne's (2008) preliminary data tentatively suggests a spring/ early summer season of use for the site.

In different, yet comparable, ways the archaeological signatures at Ayn Qasiyya and AWS 48 closely relate to the theme of a repetitive use of space. This repetitive use incorporated inhabitation and technological practices, which created instances of memorable events. It is these memories, unifying time, space and practice, which transformed physical space into social places (Casey 2008; van Dyke 2008). At Ayn Qasiyya virtually the same space was used by two different social communities one using what we now call a Nebekian lithic technology, the other a Kebaran lithic technology over extended periods of time, as suggested by the substantial thickness of archaeological deposits. At one point, people linked this use of space to more distinct forms of social practice by associating the memory of the dead with this particular locality. The interment of the dead in the marsh at Ayn Qasiyya is a critical aspect of how memory, time and space became interlinked in the creation of a socially-constructed place (see below). At AWS 48 the character of occupation was different; being more dispersed and spread out across the southern dune field of the oasis. Yet it was none the less significant in its repetitive use of space. Over the course of multiple episodes people returned to this particular part of the landscape, which was likely associated with suitable hunting and procurement location. As such, it also became associated with the memories of past activities carried out here and in its vicinity. Through the process of learning, new members of these communities of practice were able to fix their experience at these distinct loci, which helped to shape their understanding of time, place and their community. As a specialised, task specific camp, AWS 48 was orientated toward the production, repair and maintenance of composite tools prior to hunting animals, gathering food and other resources; new members of the community became socialised and inducted into the routines and practices that characterised the joint enterprise of the group at this very locality. One can consider small groups preparing for the hunt, returning to this particular spot at particular seasonal intervals throughout the year. AWS 48 may have also become associated with particular rights to land. This was established through the repeated visits to this particular part of the Azraq landscape and through the routinized practices carried out here. This sense of territoriality was also passed on to new generations through the routine and socialisation as new members became introduced to the community of practice. We can thus understand the inhabitation and dwelling at this locality as a form of socialization process that was closely connected to learning. Through dwelling these places became meaningful and thus a social landscape and a different conceptualization of social space occurred.

The shift away from the Ayn Qasiyya spring toward the silt dunes may represent a change in the social meaning of these places. Drawing on the existing social fabric and patterns of inhabitation in the Azraq Oasis, people actively shaped and renegotiated their enterprise, leading to new patterns and use of different loci in the same space. It appears that this process continued into the Late Epipalaeolithic. The Late Epipalaeolithic (Natufian) site Azraq 18 (Garrard 1991; Garrard et al. 1988) also occupied the southern silt dunes of the oasis, although a spring (Ain al-Saratan) was located nearby. This site is not only comparable to AWS 48 in its location, but also because chipped stone artefacts from the site also suggest that this also was a specialized site, with geometric microliths making up a high number of the retouched artefacts. We cannot ascertain whether these shifts were entirely conscious or not. They took place over the course of millennia and were therefore outside the control of single individuals. Events outside people's control would have clearly influenced people's choices and actions, although their responses to these external events represent their own negotiated solution to the problems they faced. As at Ayn Qasiyya, the dead became associated with this particular locality. The remains of 7 individuals were found placed in a shallow depression underlying the main occupation area at the site. Once again, the dead were referenced and played a role in how social landscapes were formed and shaped.

Looking beyond Ayn Qasiyya and AWS 48 to the major sites of Jilat 6 and Kharaneh IV, we can see clear differences in the way in which space was used and conceptualised. Favourable local environmental conditions clearly provided a necessary background to facilitate the establishment of these sites where they can be found today. Marshland conditions are attested to by the presence of clay sediments in the basal levels of Kharaneh IV, and pedogenic activity relating to a moister regime were observed in the lower levels at Jilat 6 (Garrard 1998; Garrard, Baird & Byrd 1994; Garrard et al. 1988; Muheisen 1988a; b; and see above and chapter 5). Yet, suitable local environmental conditions only go some way to explain the reason why Jilat 6 and Kharaneh IV were established where they are. This is particularly pertinent in the case of Kharaneh IV which displays an uninterrupted and very dense sequence of occupation from the Early to the Middle Epipalaeolithic. In the case of Jilat 6 a 'mega-site' can only be said to have been established by the upper phase of the site toward the later Early Epipalaeolithic and early Middle Epipalaeolithic. The size of the site during the earlier phases is however uncertain, and finds densities in the lower and middle phase are low. The site was also not as continuously occupied as Kharaneh IV appears to have been, since the settlement sequence is characterised by the deposition of sterile deposits between occupation surfaces. The Azraq Oasis would have provided as ideal or even more ideal opportunities environmentally, yet the sites in the oasis are generally smaller. This seems to represent a paradox. Looking at this issue leads us to consider potential negative drawbacks of the wet- and marshlands at Azraq, which may have prevented a too intensive occupation. Marshlands would have likely been breeding grounds for multiple insects, some of which may have easily been carriers of diseases. At the same time, abundant game in the wetlands would have likely not only attracted the attention of human hunters, but also predators which would have also posed a danger to humans. There may therefore be practical reasons as to why mega-sites were not built in the Azraq Oasis itself. Yet, conditions at other localities in the basin were somewhat comparable to the oasis environment, so that similar problems may have been apparent there, too. It seems more sensible to consider socio-cultural parameters as the predominant influencing factor on human settlement in the region.

If we consider that the 1.5 m-thick archaeological deposits, the sheer size of Kharaneh IV and the incredible density of finds attests to the likely seasonal presence of large groups of people, we must consider the underlying social reasons that bound people to commit to visiting this particular place over the course of what must have been hundreds of generations. The same applies to some extent to the upper phase of Jilat 6 and some later sites in the Wadi Jilat (e.g. Jilat 22, Jilat 8), which are also very large and dense sites. The impression of repetitiveness in the repeated visiting of these places is evident in the highly minuscule stratification of deposits at Kharaneh IV. Excavations in the Early Epipalaeolithic parts of the site, initially described by Muheisen (Muheisen 1988a, b)and recently confirmed by re excavation of the site as part of the *Epipalaeolithic Foragers in Azraq Project*, showed a series of 2-3 cm-thick, horizontally-running bands representing distinct occupation surfaces that often included traces of fireplaces in the form of ash deposits and burnt areas. These layers were interspersed with 10-15 cm-thick deposits of occupational debris. The uniqueness and highly detailed nature of this sequence, in addition to the sheer size of 2 hectares, cannot be underestimated. Comparison to both Natufian sites and even much later tells are not unwarranted. Thickness of and density of finds in archaeological deposits has been cited as one of the characteristics of sedentary Natufian base camps, in addition to architecture, ground stone tools and burials. Few would contest Kharaneh IV as a sedentary Natufian base camp, if there was a Natufian phase at the site. The only reason why Kharaneh IV and Jilat 6 upper phase are often not considered explicitly in discussions of settlement patterns and the emergence of sedentism in the Epipalaeolithic is because they are perceived to be too early and they are not located in the Mediterranean core zone. But, these two ‘mega-sites’ – a term that attempts to grasp their abnormality – show that way in which humans related to space and landscape in the Epipalaeolithic had changed here in the Azraq Basin. The stratigraphic signature at Kharaneh IV highlights the routinized nature of occupation, which involved a multitude of activities, people and materials binding experience with time and place

Figure 10.2:
Photograph of west section in Area B at Kharaneh IV, detailing the fine-grained stratigraphic of the Early Epipalaeolithic (courtesy of the Epipalaeolithic Foragers in Azraq Project)

(Figure 10.2). Occupational event, layered over occupational event, is documented in the fine occupational horizons visible in section, which relate to the repetitive reuse of this space time and time again. Hundreds of thousands of waste products from flint knapping, discarded stone tools, and other material culture items, signify the intensity of occupation and the reiteration of practices. Over time, these activities resulted in the construction of ever more elaborate forms of dwelling. During the 2008 excavation at Kharaneh IV a thick, medium brown and highly organic deposit that appears to represent a former hut floor was recognised in section. In the Middle Epipalaeolithic part of the site Muheisen reported not only a distinct floor, but also a series of post holes found in close association to it (Muheisen 1988a, b). These instances are yet further investments in how space was shaped and articulated. People became more and more invested to these places, connecting them and their social memories.

Although Jilat 6 upper phase is comparable to Kharaneh IV in size, density of finds and thickness of depositional sequence, Kharaneh IV's intensive occupation begins earlier and the character of the stratigraphic sequence display subtle variation. Minute occupation surfaces were only found in the upper phase (A) of the site, whereas Phases B and C contained more isolated, yet distinct, occupation surfaces (Garrard, Baird & Byrd 1994: 190). Kharaneh IV clearly shows a highly routinized and repetitive use of particular landscape locales in the Azraq Basin, and the same can be said for the upper phase of Jilat 6, which very likely also relates to multiple, long-term revisits of groups to the same locality. These sites are the strongest hint yet how the reuse of these parts of the landscape became part of routinized social practices associated with particular communities of practice through which different understandings of the landscape were enabled, articulated and manifested, and how these became further and further involved in the negotiation of social practice. These communities built on previous experiences of place, past memories of actions and engagements, to create new social forms of interaction, socialization and negotiation. They established new patterns of learning that shaped their identities through socialization and created new forms of inhabiting the landscape. Through these forms multiple social strategies of economization and enculturation became channelled. People drew on these social structures and fields of engagement to pursue differ-

Figure 10.3: The complete burial from Kharaneh IV (from Muheisen 1988b).

ent social strategies, and to maintain and create new social identities. At the same time, the social fixing of places committed people to localities and imposed patterns of movement on them. I have stressed how routines and habitual engagements resulted in the fixing of places and how this condition forced people into patterns of behaviour and practice. This was therefore a two-way process in which the creation and upholding of social structures formed a complex interplay.

We can consider the interment of the dead at both Ayn Qasiyya and Kharaneh IV to be part of this general process of constructing places, although they represent special instances. Burying the dead has the added consequence that not only is the act of burial remembered as an event, but through linking the deceased's placement with her or his life, a further link of memory and association is created, binding together the past and present in a particular locality. From this perspective it is interesting to reflect upon the similarities and differences between the burial at Kharaneh IV and Ayn Qasiyya. At Kharaneh IV, the remains of two individuals were found (Muheisen 1988a, b; Rolston 1982). While one was highly fragmentary, the other was complete and interred in a supine position, with its head seemingly propped up. Two medium-sized stones were found placed above the skull, while two further stones had been placed over the legs. The individual was found in a shallow pit excavated into the lower layer V, and infilled with ashy sediment containing groundstone fragments (Figure 10.3). Two gazelle horn cores were reported in close proximity to the skull. Although the excavator claims they were found in close association with the skull (Muheisen 1988a, b) this cannot be independently verified on the basis of the published excavation results. Following interment the site was reoccupied and an occupation surface established above where the skeleton lay. This appears to reflect the incorporation of the dead into the ongoing process of settlement and mirrors much later practices of burial under house floors in the late Epipalaeolithic, PPNA or the PPNB. Clearly, such tendencies were already apparent during the earlier Epipalaeolithic. But the burial of the dead in such a way also reaffirms a sense of fixture and permanence. The placement of stones above the skull and over the legs of the body could be interpreted as a way of weighing down the body. The excavation of a pit reflects a further aspect of fixing the body of the dead in a particular place and time. We cannot underestimate the importance of the social construction of the human body by the living and the ascription of personal identities that may have influenced how the dead were treated (Fowler 2002; Joyce 2004, 2005; Kus 1992; Meskell 1999, 2000; Pluciennik 2002a; Tarlow 2002; Thomas 2002; Yates 1993). Bodies and embodied identities are means to construct and realize social strategies. While we cannot access the precise meaning or perception of the body in the context in the Early Epipalaeolithic, we can compare the treatment of the dead at Kharaneh IV and Ayn Qasiyya. Unfortunately, we lack the necessary contextual information on the second fragmentary burial from Kharaneh IV that would provide more insights into these patterns.

Although aspects of the burial of the Ayn Qasiyya individual could also be seen as 'fixed', I would like to suggest that there appears to be an element of 'fluidity' here. Close examination of the skeleton's position suggests that the body was placed into the soft soil of the Azraq marsh in an upright position, with the legs tightly flexed and fixated to the body (Figure 6.33, 6.36 & 10.4). The position of the body as found has been interpreted as the result of post-depositional processes, in which the legs were pushed to the outside by pressure from the accumulated sediment. This is attested to by the position of the metatarsals and phalanges, as well as the fibulae behind the tibiae (see chapter 6). The tightly flexed position is viewed as evidence for binding the limbs to the torso with string, ropes or indeed using cloth. An upright sitting position is also indicated by the position of the cranium, which was found at an angled position on the ribcage, suggesting that it may have tumbled from its *in situ* location onto the chest. The absence of a burial pit suggests that the bound body was directly placed into the soft marsh soil of the Azraq wetlands. Thus, the deposition of the dead here was not associated with more permanent burial features. No pit was excavated and the site appears not to have been reoccupied at the same location after burial, since the remains were found in the uppermost section of the marsh deposit at the interface to the topsoil (see chapter 6). The creation and association of memory with the locus of the Azraq wetlands was therefore a quite different practice than that involving the remains of the dead at Kharaneh IV. Instead of incorporating the dead into the space of the living at Ayn Qasiyya the remains of the dead were left to their own devises, left to decay in the fluent and transient nature of the marshland environment.

The extraordinary chance find of human remains at Ayn Qasiyya highlights Nadel's (Nadel 1994, 1995) observation of the invisibility of Early Epipalaeolithic burial customs. He discussed how the character of interment of the dead, often in shallow burial pits liable to be eroded and destroyed, may be responsible for the relative invisibility of burials during the Early Epipalaeolithic. The Ayn Qasiyya burial may represent an instance of precisely this pattern. The absence of fixed burial installations reflects fluidity and flexibility in how the body of the dead may have been perceived. It contrasts with the case of Kharaneh IV where fixture, referencing, incorporation and social reworking of the dead appear to have been a more apparent theme. It is intriguing to relate these disparate patterns to the nature of settlement at both sites; Kharaneh IV reflects fixture and permanence in the landscape, whereas occupations at Ayn Qasiyya could be seen as more fleeting and momentary. It would appear that the way in which memory was constructed

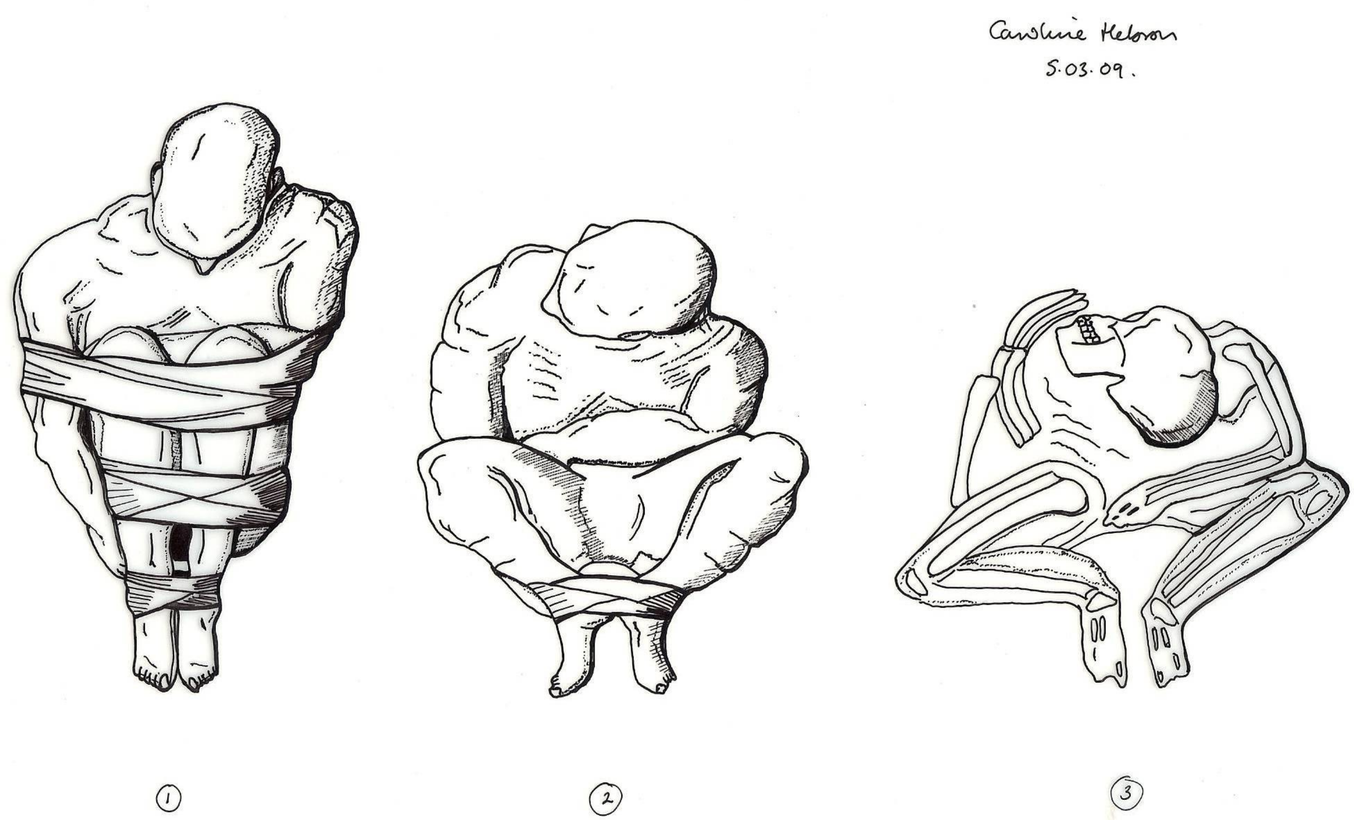


Figure 10.4: Suggested reconstruction of the Ayn Qasiyya burial's formation process (drawing by Caroline Hebrons)

using and referencing the dead at both sites differed and indicates the social parameters through which these communities constructed memory and thereby places. Both offer a different perspective on how the people's dwelling at these localities was constructed, maintained and negotiated. This had implications for the continued use of these sites and the surrounding landscape. At Ayn Qasiyya the burial of the dead in the marsh where the body was left to decay appears to also have marked the last stage of use of this particular locality, since the burial was found at the interface with the topsoil. The Kharaneh IV burial, reflecting fixture and permanence, became part of the fabric of occupations at the site. Occupations were established above the burial and carried on for multiple generations. It is tempting to interpret these patterns as using the human remains to create fixed places in the landscape, albeit places that had different kinds of meaning. At Ayn Qasiyya abandonment appears to have followed, whereas at Kharaneh IV continuity was ensured. Incorporating the dead into the space of the living at Kharaneh IV by re-occupying the site over and over again resulted in the build up of a substantial settlement sequence and a now-massive archaeological site. At Ayn Qasiyya the fleeting and momentary treatment of the dead did not result in the same pattern of occupation. Instead, people moved on and used other parts of the landscape. It is, however, possible that people using a Nebekian lithic industry re-occupied the site at a later point in time, as attested to by the stratigraphic succession and material culture in Area D. However, the timing of these events cannot be disentangled easily. It is through both practices, as well as burials, that places were 'created' and maintained in people's memory. In the case of Kharaneh IV the remains of the dead were part of the fabric and social strategy that bound and committed people to return to this place on future occasions and reuse it time and time again.

Some of these processes continued and expanded during the Late Epipalaeolithic. The human remains found at Azraq 18 (two adults and five juveniles) were buried in a shallow pit below the main occupation. Fanny Boquentin's recent reanalysis of the human remains appears to reflect multiple and repeated primary burials (Boquentin forthcoming; Garrard, personal communication). Both the adult skulls were ochre-stained, which appears to suggest that they were once painted after decomposition of the flesh. The reiteration of human burial in the same location and the continuation of use of the same locality by Natufian groups seems similar to the pattern described for Kharaneh IV. The interment of the dead was a repetitive occurrence that surely marked this particular space as a special locality within the wider landscape. It fixed memories in time and space, and further anchored people within their landscapes. It is these fixtures of place that heralded a marked change in people's relation to place and landscape. These commitments and habitual practices bound people to each other and communities to particular localities. It marks the beginning of a process that over time became more and differently articulated and expressed, with the physical alteration of space becoming an ever more potent social strategy.

OBJECTS, NETWORKS AND LANDSCAPES IN AND BEYOND THE AZRAQ BASIN

It has been a widely acknowledged, key aspect of landscape archaeology that landscapes are not simply composed of sites and their spatial distribution. Indeed, the notion of site is problematic (Dunnell 1992; Thomas 2001) and so far I have concentrated on a discussion focusing mostly on sites directly. However, I would now like to consider how communities defined through their shared histories of learning at different localities interacted and how they constructed their social landscapes through this social interaction. To do so, I will consider the interrelated webs of practice, materials, objects, and movement to discuss how people in different social communities engaged with one another. This discussion will also highlight how this interaction fits in with other regions of the Southern Levant and how the Azraq Basin was incorporated into a wider cultural sphere. I will show how this social interaction shaped people's experience and made the Azraq Basin the centre of their social worlds. The starting point for these considerations is once again the patterns evident in the spatial distribution and technological character of the Epipalaeolithic lithic industries. As I discussed earlier, we can distinguish two contemporary Early Epipalaeolithic lithic industries in the Azraq basin, the Nebekian and Kebaran, which, apart from Ayn Qasiyya, show a spatial disparity. I argued above that we can understand this pattern as reflecting the different histories of learning shared amongst the members of distinct communities of practice. The fact that the material culture patterning occurs spatially separated across the Southern Levant reinforces the idea that these reflect two distinct learning complexes that share amongst themselves a history of learning. Whether or not these also correspond to distinct ethnic communities cannot be independently verified empirically, and for the sake of the argument here is also of no consequence. What seems to be clear is that these patterns are real and verifiable archaeologically and that they reflect, in my opinion, a process of situated learning closely related to the maintenance and creation of identities within a larger organizational social structure, referred to earlier as a *community of practice*. How then did these learning communities relate to one another, if at all?

Circumstantial evidence is available from Ayn Qasiyya directly. Ayn Qasiyya is the only site in the Southern Levant that has produced lithic assemblages from both principal lithic industries of the Early Epipalaeolithic. Since these appear to be broadly contemporary at the site, and are considered contemporary occurrences on the basis of the C14 dates across the Southern Levant, we necessarily consider how members of each community may have interacted. It is interesting in this respect to consider that while these industries occur together at Ayn Qasiyya, elsewhere in the Azraq Basin they do not. Can we therefore consider the Azraq Oasis as a space at which different groups came together at various times throughout the year and potentially interacted? It is easy to imagine the lush oasis environment to be an attractive location to different Epipalaeolithic groups and likely was one location in a system of seasonal movement through the Azraq Basin. A fascinating aspect of this potential pattern is that no mega-sites can be found within the oasis setting itself, although the evidence indicates that the oasis would have provided ideal environmental and ecological conditions to allow for such intense and long-lived occupations. Although one could consider certain negative aspects of living in a wet- and marshland environment, which I briefly alluded to previously, these conditions are likely to have been comparable to other wet- and marshland settings throughout the Azraq Basin. Thus, the same negative aspects of wet- and marshlands ought to apply there. Since ecological and environmental reasons are not causative here, one may assume that social parameters are critical to explain the lack of such sites in the vicinity of the oasis. One could imagine that distributed hunting rights restricted access to the oasis either in terms which parts of it were used by different groups or at what times of the year it could be used. Both Jilat 6 and Kharaneh IV are located 65 km and 40 km away from the oasis, respectively, and represent a good two days walk, if one applies ethnographically-known hunter-gatherer walking distances (Binford 1983). This means a group could migrate to the oasis at select periods during the year or on several occasions to procure various resources in the oasis and its vicinity, before returning to a more permanent, larger camp.

There is corroborating evidence that such trips occurred. Groundstone tools made from basalt were found at both Jilat 6 and Kharaneh IV. However, basalt does not occur naturally in the vicinity of either site. Apart from basalt sources in the Kerak district to the west, the closest sources of basalt to either site are located to the immediate north of Uweynid 14/18. Further basalt sources occur north and east of the oasis. This implies that basalt was transported over considerable distances; if they derived from the Uweynid sources they travelled a minimum of 43 km in the case of Jilat 6, and 27 km in the case of Kharaneh IV. This evidence for transportation, in conjunction with the presence of both Nebekian and Kebaran lithics at Ayn Qasiyya, raises the strong possibility of social interaction between these differently constituted communities. As they moved through the landscape procuring raw materials from various resources it is very likely that people encountered each other. Such movements and encounters also shaped the social perception of the landscape and helped to construct it conceptually. People's interaction at particular locales was remembered, and paths used while transversing through the Azraq landscape also became part of this physical and social engagement. In the discussion of flint raw material sources used at Ayn Qasiyya (chapter 6) I suggested that material was collected as part of routine movements around the landscape. The examination of raw material showed that it consists of two different types of flint that likely come from different sources. Thus procurement can be related to different patterns of movement around the landscape. But I also highlighted that, based on ethnographic accounts; these may link in to wider social or cosmological understandings of space. The patterns of movements and procurement of raw materials also socialized people, bringing sources, materials, and people together through practice. Using flints, people carried with them memories of activities to other places, with objects acting as symbolic referents to these other locations, times and practices. They may have been considered powerful or important for a variety of reasons, and the difference in use of raw materials links into the way in which these communities of practice negotiated their enterprise by drawing on different kinds of material repertoires.

There is other direct archaeological evidence, I would argue, that these engagements occurred. Marine shells have been found at Jilat 6, 8, 10, 22, Azraq 17, Uweynid 18 (Garrard, Baird & Byrd 1994; Reese 1991) and Kharaneh IV (Muheisen 1988a, b, c; Reese 1991). Recent excavations at Kharaneh IV have produced further numerous marine shells particularly from the later phases. The majority of the shells are pierced and are commonly interpreted as beads or pendants. The specific species of these marine gastropods has been studied in detail by Reese (1991). His analysis showed that *Dentalium*, *Nerita* and *Arcularia* shells were present in the material studied from the Azraq Basin sites. While *Dentalium* shells occur both in the Red Sea and the Mediterranean, *Nerita* shells are only common in the Red Sea, and *Arcularia* native only to the Mediterranean. Bearing in mind that the lithic industries common to both Jilat 6 and Uweynid 14/18 can be considered to be very similar to those of Southern Jordan in close proximity to the Red Sea, and that the lithic industry of Kharaneh IV is related to those of the western, Mediterranean Levant (Figure 10.5), it is intriguing to note that Jilat 6 produced some *Arcularia* shells, and Kharaneh IV *Nerita* shells (Reese 1991). Recent excavations at Kharaneh IV confirmed the presence of multiple shell beads especially in the Middle Epipalaeolithic phase, although they were also found in lower frequency in the lower strata associated with a Kebaran lithic industry. Although further identification and analysis of this material is yet outstanding, initial visual inspection of the material indicates the presence of *Nerita* and *Arcularia* shells. At Jilat 6, a majority of the sea shells are associated with the upper phase at the site, which post dates the Nebekian occupations here. Nevertheless, some sea shells were evident also in the lower strata (Reese's 1991 study does not differentiate between the different sub-phases of the site). An interesting tendency begins to

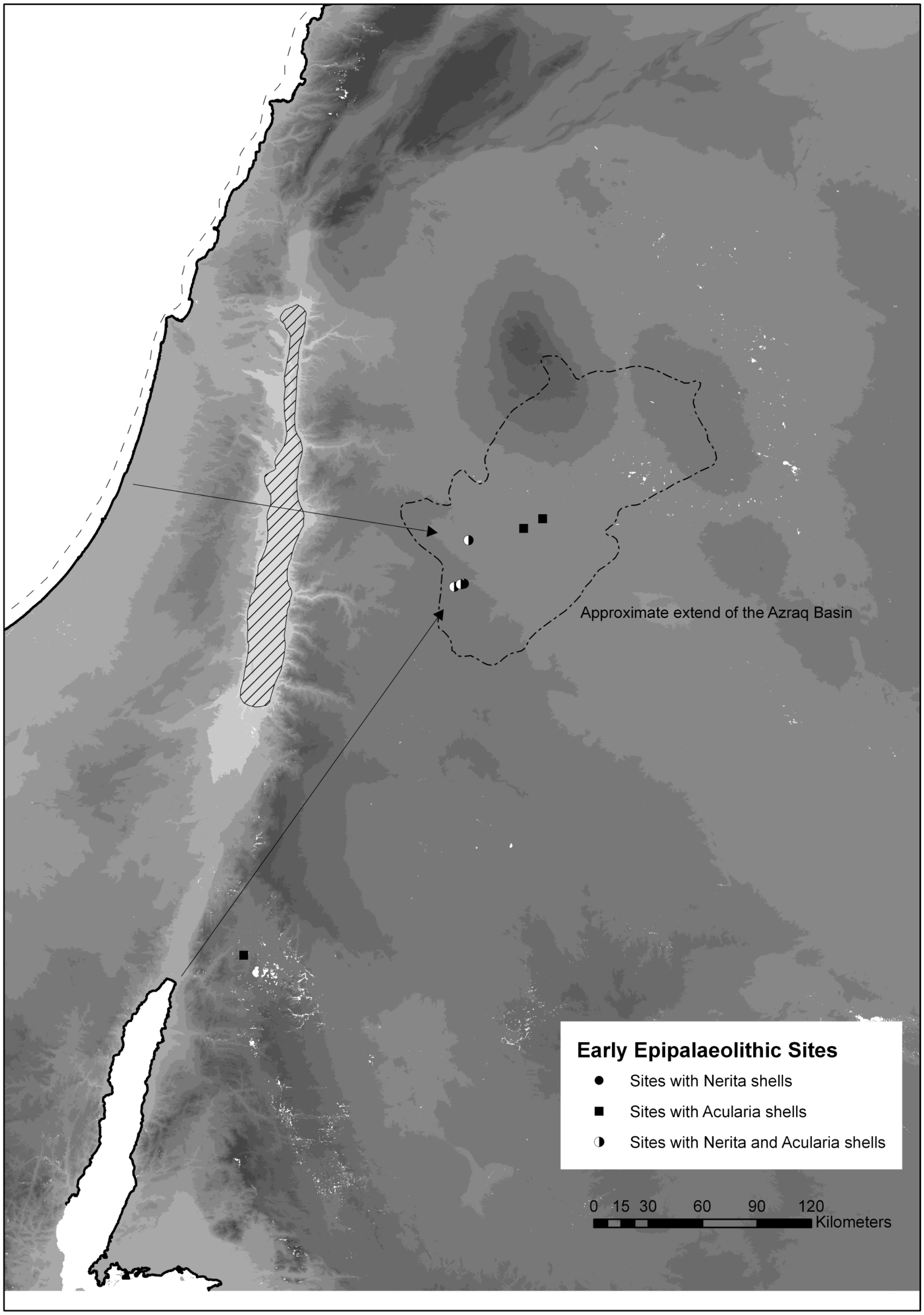


Figure 10.5: Early Epipalaeolithic sites in the southern Levant with Nerita, Arcularia or both types of shells (after data from Reese, 1991).

emerge here; Mediterranean Sea shells are found on sites that are associated with an otherwise exclusively East Levantine lithic industry that is more closely connected with the Red Sea by virtue of the sites in the Hamra region of Southern Jordan (Henry 1995; Figure 10.6). At the same time Red Sea shells are found on sites associated with a western Levantine lithic industry usually related to the Mediterranean zone. This pattern stretches as far that *Arcularia* shells are found even in Southern Jordanian sites at J201 and J202 (Reese 1991: 623). No Red Sea shells appear to have crossed the Jordan Valley threshold, however, prior to the late Epipalaeolithic.

The presence of both Mediterranean and Red Sea shells at sites in the Azraq Basin first of all clearly implies long distance transport and/or exchange. It seems therefore fairly evident that the Azraq Basin was linked into a wider network of movement and material exchange throughout the Southern Levant. On the basis that the Early Epipalaeolithic lithic industries appear as quite distinct and spatially separate technological entities, and given the discussion of how these entities may relate to distinct *communities of practice*, we can consider the distribution of these shells in the Azraq Basin as evidence for exchange and social interaction that is likely to have taken place locally. This process appears to have become more and more evident from the Early to the Middle Epipalaeolithic. Interestingly, techno-typological differences also appear to be less distinct as time progresses, suggesting that learning communities' material repertoires and their shared histories of knowledge became mixed. The Nizzanian lithic industry, accompanied by shell beads from both Red Sea and Mediterranean sources, can be found at both Jilat 6 and Kharaneh IV toward the later part of the Early Epipalaeolithic and the earlier part of the Middle Epipalaeolithic. This evidence would seem to hint at the increasing intensity of these social interactions and the blurring of the differences between these cultural traditions.

The precise nature of interactions at which shell beads were exchanged remains naturally hidden to the modern observer. They could have been given as part of establishing social ties, taken as loot during conflict situations, or exchanged for other exotic items or materials of which we are unaware. Regardless of the specifics of this exchange mechanism, the evidence that it occurred indicates that some form of social interaction occurred between these communities. This interaction represents another building block of the social construction of the Azraq landscape, since places at which these exchanges occurred became part of the landscapes fabric and conceptual set up. Evidence for social engagement also shows that, rather than considering occupations in the region as fleeting and temporary, since they are located in a marginal zone, this interaction shows that the Azraq Basin can be considered the centre of these communities' social worlds. These instances of interaction were remembered and referenced, and helped to build and sustain social networks in and beyond the Azraq Basin. The exotic nature of the sea shells derived from hundreds of kilometres away (290 km to the Red Sea and 170 km to the Mediterranean) highlights their likely value in these exchanges. Not only do they represent a considerable effort on behalf of the communities that collected and transported them, but their appearance and presence in the Azraq Basin also referenced other landscapes, places and temporalities. It is this relationship to their place of origin that likely made them attractive items to be exchanged between groups, and through their material presence linked people and places in the Azraq Basin with other landscapes and localities beyond.

MARGINALITY, SOCIAL EVOLUTION AND THE EPIPALAEOLITHIC IN THE SOUTHERN LEVANT

Palaeoenvironmental data gathered as part of previous research projects and resulting from the examination of geoarchaeological sections at Ayn Qasiyya shows that local environmental conditions in the Azraq Basin were much more amenable than is commonly assumed in macro-scale climatic predictions. The density of sites and the size and intensity of some of them also shows that conditions must have been suitable to sustain human occupation. The technological characteristics of chipped stone assemblages from the basin can be used to reconstruct social communities that share histories of learning, and who defined themselves through practice. These communities created places in the landscape; they inhabited spaces that became associated with memories and meaning through the practices and social engagements carried out at these locales. Movements through the landscape created paths, routes and opportunities for encounters that further conceptualized the landscape, creating arenas and spaces for social engagement and interaction. This interaction can be reconstructed through a study of likely material exchanges between sites and communities. While lithic assemblages reflect technological habits, gestures and traditions that involve practical know how and embodied experiences of doing things a certain way, shell pendants and beads show wider connections within the Levantine landscape as a whole. They provide evidence for the social interactions between these different learning communities and show that the Azraq Basin was a region that groups came to, lived at and interacted in. We cannot yet say much about the nature of these interactions, but it is clear that on one level or another they occurred. Whether these were gift exchanges, resulted from co-operation or competition, exchange of marriage partners, or indeed conflict, we cannot say. Traditionally, competition and marriage have been put forward as explanations, sticking to a recurrent theme in social evolutionary thought (Henry 1989, 1995). But, there is no evidence to suggest that either of these occurred. Instead of conflict it would be equally sensible to consider ways in which these communities cooperated (Barnard 1993; Kropotkin 1998 ; Lee 1988). They may have formed co-operative hunting groups preying on large herds of seasonally migrating gazelles.

The evidence for human engagement, the intensity of human occupation in the area, the way in which the Azraq Basin fit into, and was linked to, other regions of the Southern Levant by material exchanges and networks, as well as the different palaeoenvironmental picture, shows that the Azraq Basin was anything but a marginal zone. Indeed, it was central to these communities' social experience and how they created their social landscapes and spaces. The concept of phyto-geographical zones and the geographical dichotomy it creates blends over these local variations in social life and palaeoenvironment, which can be reconstructed through a more direct engagement with the past practices of communities and the archaeological context. The idea of the marginal has imposed a hierarchy on the understanding of the Southern Levantine landscape and its role in the shaping of the social, cultural and economic transformations that characterised the final Pleistocene and early Holocene. In the same way that scholars now critique the idea of the PPNB 'interaction sphere' (Asouti 2006; Watkins 2008), it can be argued that the core/periphery model of the Epipalaeolithic is an outdated and obsolete concept which does little to explain in detail why these transformations and changes came about. Hence, it should be abandoned in favour of a more nuanced approach that considers the lifeways, interactions and social practices of communities more directly and at a closer level, in order to interrogate the local articulation and negotiation of social structures, how they were maintained, challenged and altered, leading to the creation of different means of social engagement.

Through their practices and social engagements communities created places, and these places simultaneously influenced those very practices and engagements. This recursive process resulted in the fixing of places in the landscape and the creation of interconnected social spaces in which human interaction took place. It is this recursive development linking social practice and places that fundamentally altered the way in which humans related to the landscape, and over time articulated their relationship with space in different ways. We have seen that in the Azraq Basin some settlements were ephemeral, fleeting, while others resulted in the massive accumulation of occupation debris. At some sites, the dead became linked to the living, referenced and incorporated into how space was understood and utilized. But there is no necessary linearity to these spatial practices. This is seen in the shifting settlement pattern at AWS 48. This is not a linear progression from Jilat 6, Kharaneh IV, or even Ayn Qasiyya. It is a local development of a communities' that found their very own way to deal with an issue that confronted their joint enterprise, and through mutual engagement and negotiation they found practical solutions to it. However, what this resulted in were social commitments to place, memory and interaction. Kharaneh IV and Jilat 6 upper phase show this commitment to place and the coming together of people and communities in one locality, and to the interactions that took place between people here and other communities. Hodder (2007) has previously outlined how people's repetitive use of space and their increasing social commitments became more and more articulated in engagements and alterations of space, culminating in the emergence of architecture. The Azraq Basin attests to the longevity of these processes beginning in the Early Epipalaeolithic, and to their variability. It also reiterates patterns observed at other Early and Middle Epipalaeolithic sites. At Ohalo II, which was likely occupied either for prolonged periods throughout the year or even on a year-round basis (Nadel 2002, 2004a, 2006) individual huts contained several superimposed floors, which indicate re-layering of brush for repeated occupations within the same structure. At the Middle Epipalaeolithic site of Uyyun al-Hammam (Maher 2005, 2007) the recent discovery of multiple human burials also suggests repeated revisits and the emergence of distinct cemeteries by ca. 16-15,000 cal. B.P. The occurrence of architecture during the Geometric Kebaran, especially in the case of Neve David, is also now well-attested. Here human groups began to fundamentally alter space physically, prior to the Natufian, but this reiterates patterns that began at least during the Early Epipalaeolithic. Although variability can be seen in the different nature of sites across this region and, for example, in the way in which human remains were treated, there is a common theme to these engagements and alterations of spatiality. It is these commitments and engagements that preceded the emergence of more permanent architecture, sedentism and what is referred to as villages during the Natufian. These were long-term social processes not precipitated by climatic events as a singular cause or underlying motor of development.

The Azraq Basin emerges as a place that must have been very much central to people's social experience and being; a location in which different communities came together and interacted. These communities had links to other groups across the Transjordanian Plateau and into Southern Jordan and the Central Levant, with whom they shared technological knowledge and with whom they engaged. This pattern appears to have lasted into the Late Epipalaeolithic, although our available data for this time frame in the Azraq Basin is scarce at present. AWS 48 shows that settlement patterns changed, but the site is too ephemeral to provide further data for our understanding. Neither Kharaneh IV nor the sites in the Wadi Jilat fit clearly with the lithic material culture from AWS 48. Nevertheless, these patterns of occupations were long-lasting and exhibit a unique resilience and recurrence stretching across multiple generations. They attest to the cultural memory and repetition of social structures throughout this region. These once again became most clearly articulated in the Late Epipalaeolithic Natufian. It is then that people also translated their altered understanding of space into more concrete physical transformations of places and landscapes, when they built lasting structures. Yet, this emergence referenced earlier patterns, practices and interactions.

In sum, the evidence outlined here is conceptualized within a practice-orientated framework and shows that there are alternative ways to think through the unique social and cultural transformations of the Epipalaeolithic. The geographical dichotomy on which current social evolutionary narratives operate can be rejected given palaeoenvironmental data that shows great local variation. The Azraq Basin was not marginal, but the very centre of various communities social lives, and linked to other parts of the Levantine Epipalaeolithic landscape. These interpretations oppose deterministic, progressive social evolutionary models that categorize human social life into typologies and stages of development, irrespective of the archaeological evidence for social interaction and engagement available to us. People constructed places, landscapes and their communities through practice well before the advent of those social evolutionary milestones that we have long perceived as the cornerstones of the Neolithic Revolution. Their actions fixed places in the landscape and thereby created social spaces in which they interacted in manifold ways. Their actions were engrained a web of social life, engagement with the physical environment and with other communities, and they articulated solutions to the problems their joint enterprises faced that were of their own particular making.

Chapter 11: Summary and Conclusion

This thesis has been concerned with our understanding of the Epipalaeolithic period in the Levant as an era characterised by unique socio-cultural changes that directly preceded the emergence of agriculture. The Epipalaeolithic therefore has a direct bearing on our understanding of how and why these changes occurred. My critique in chapter 2 has been that the nature, origins, speed and causes for these changes have often been discussed within a social evolutionary framework. The social evolutionary model has positioned these changes within a basically unilineal, progressive scheme; the Early and Middle Epipalaeolithic was characterised by 'simple' hunter-gatherers possessing an immediate-return or foraging economy, were highly mobile, predominantly relied on hunting for their subsistence, and had no social hierarchies. During the Late Epipalaeolithic, Natufian groups developed into 'complex' hunter-gatherers, with a delayed-return or collectors' economy, with a semi-sedentary or fully sedentary life-style, who relied on the intensive collection of wild cereals, and a hierarchical social structure. This increasing social, cultural and economic complexity gave rise first to the cultivation of plants, enabling people to become sedentary and construct larger and more permanent settlements. The driving factor behind these changes has been identified as the climatic and environmental changes occurring throughout the final Pleistocene and the early Holocene, as well as a steady increase in human population size (Bar-Yosef 1987b, 1989; Bar-Yosef 1995, 1996; Bar-Yosef 1998; Bar-Yosef 2004; Bar-Yosef & Belfer-Cohen 1989, 1991, 1992; Bar-Yosef & Belfer-Cohen 2000; Bar-Yosef & Meadow 1995; Binford 1968, 1983; Braidwood 1971; Byrd 1994a; Fellner 1995a; Flannery 1969, 1972, 1973, 2002; Goring-Morris & Belfer-Cohen 1998; Goring-Morris et al. 2009; Henry 1989, 1995; MacNeish 1992; Rosenberg 1990; Weisdorf 2005).

These driving factors – demography and climate change – have been discussed on the basis of the particular characteristics of the Levantine landscape. Modern studies of plant distributions, mean annual precipitation, and geography, have led to the delineation of three distinct phyto-geographical zones. Due to climatic change the expansion and contraction of these zones, and consequently the ecological affordances available to Epipalaeolithic groups, has been seen as the key ecological principle driving socio-cultural change. Contractions and expansions variable are said to have caused the coalescence or dissolution of dense populations in the Mediterranean 'core zone', which in turn drove the adoption of new technological and social adaptations. For example, the coalescence of groups in the Mediterranean zone during the later part of the Middle Epipalaeolithic is said to have resulted in the emergence of the Natufian of intensified cereal exploitation and the emergence of inter-group stylistic differentiation. The 'periphery', which consists of the semi-arid to arid steppes and deserts in the Sinai, Negev, and the eastern Levant, played a less critical role in these developments. Here, desert-specific adaptations arose, such as the Harifian, which are considered evolutionary dead ends that did not contribute much to the subsequent emergence of agriculture. This geographical dichotomy between the 'core' and the 'periphery' has been a persuasive model on which the discussion of the socio-cultural developments in the Epipalaeolithic has been built.

My critique of this model is based on two observations. The social evolutionary meta-narrative which is engrained in the discussion of the simple-to-complex hunter-gatherer typology has come under considerable critique both in cultural anthropology, as well as in archaeology in recent years (Bamforth 2002; Barnard 2004; Barrett 1994, 1999; Barrett 2001; Bird-David 1992a, b; Boyd 2002, 2004, 2006; Gamble 2004, 2007; Gamble & Gittins 2004; Gosden 1999; Hodder 1986; Ingold 1992, 1996, 1998, 2000, 2002a, b, 2004; Pluciennik 2001, 2002b, 2004, 2005). The implications of this critique have to date been rarely fully applied or acknowledged in Levantine prehistoric archaeology. One aim of this thesis has been to utilise the implications of this critique to construct an alternative perspective of the Epipalaeolithic, and its role in the transition to agriculture. The second aspect I highlighted are some of the problems associated with using climate, demography and in particular the geographical dichotomy between core and periphery as the driving explanatory parameter to discuss social, cultural and economic changes in the Epipalaeolithic. These two critiques are closely connected. Whereas social evolution is the metaphysical framework, the geographical dichotomy is the causative epistemology.

I outlined both empirical as well as epistemological reasons why both social evolution and this geographical dichotomy should be reconsidered. Archaeological data available from the southern Levant show that Early and Middle Epipalaeolithic sites contain evidence for the intensive exploitation of wild cereals, 'complex' symbolism associated with human burials, and the multi-seasonal, prolonged occupation of sites, which all pre-date the Late Epipalaeolithic Natufian (Maher 2007b, in print; Nadel 2002; Verhoeven 2004; Watkins 2005a, b). Likewise, I discussed how some of the evidence for Natufian cultural 'complexity' has been critically reviewed (Belfer-Cohen 1995; Boyd 2001, 2004, 2006; Byrd & Monahan 1995; Edwards 1989b). Sedentism, social hierarchies and even the evidence for storage and intensive wild cereal exploitation are all not entirely supported by the archaeological evidence. A similar case can be made for the early Neolithic PPNA, which had traditionally been seen as a fully-fledged Neolithic phase, but is now much more likened to a gathering and hunting life-style with sporadic, horticultural cultivation. The data linking climatic and environmental change, and therefore the basis of the transfer of the phyto-geographical zone model into the past, is also problematic (Cappers et al. 1998; Cordova 2007; Meadows 2004; Robinson 2006; Rosen 2007). As yet, palaeoenvironmental datasets for the late Pleistocene and early Holocene Levant provide too patchy a picture to allow us to correlate cultural change with climatic change. Pollen cores across the region are only broadly in agreement, while they and other data sources largely detail macro-scale, long-term trends in climate. Too little regional and sub-regional work which can be directly linked to localized archaeological sequences has to date been carried out. Where this work has been done, it has not produced clear-cut evidence for the supposedly dramatic impact of climatic changes on society. While the environment clearly played a role and affected communities in a range of ways, the currently available chronological framework does not provide a coherent correlation between macro-level climatic changes and cultural change. Work on regional sequences, such as that carried out in the Azraq Basin by previous projects and as discussed in this thesis, clearly shows that there was regional variation in environmental conditions that does not straightforwardly conform to the concept of phyto-geographical zones subdivided into arid periphery and lush core.

In addition to these objections, I have argued that a reductive and totalizing conceptualisation of human society sits at the heart of the social evolutionary narrative (Pluciennik 2005; Shanks & Tilley 1987a, b). 'Simple' hunter-gatherers are considered less able to affect change in the environment or to take control over their resources, and can are therefore afforded little to no agency. External stimuli and dominant social structures force adaptations upon them, which appear to make them act without having little influence or choice over their own actions. I have critiqued this causality by highlighting the impact of agency and practice centred approaches, which consider cultural change *and* cultural stability to occur in practice as a result of the negotiation between social structures and individuals (Barrett 1988, 1994, 1999, 2000; Barrett 2001; Barrett & Fewster 1999; Bourdieu 1977, 1990, 1998; Boyd 2004; Gardner 2004, 2007; Giddens 1979, 1984; Hodder 2000; Ingold 2000; Shanks & Tilley 1987b). Multiple, interconnected forces come together in these negotiations, ranging from physical constraints and environmental change on one end of the scale, to power and identity on the other. I have outlined this approach in chapter 3 and have contextualised it against the concept of landscape. Landscape is of critical importance here, because it relates directly to the causative epistemology of the core-periphery model. In this model landscape has to necessarily be seen as an inert, physical entity that imposes constraints on society. But, following a practice-centred approach we necessarily have to situate landscape within the realm of the social negotiations between agents and social structures. The concept of the periphery imposes a modern conceptualisation of space onto the past, which governs our understanding of how socio-cultural change occurred in the southern Levant. I have instead highlighted the importance of considering landscape as the locus of dwelling and action to move away from a static and dichotomous conceptualisation, toward a more nuanced perspective on how people simultaneously shaped and were being shaped by the social spaces they created and inhabited through their actions (Barrett 1999; Bender 1993a, 1999; Bird-David 1990; Boyd 2004; Casey 1993, 2008; Chadwick 2004a; Conneller 2000, 2001 2005, 2006; Cosgrove 1984; David & Thomas 2008a, b; Hirsch & O'Hanlon 1995; Ingold 1993, 1998, 2000; Layton & Ucko 1999; McFadyen 2006; Simmons 1993; Thomas 2001, 2008; van Dyke 2008).

A critical part of studying, describing and discussing these practices and how they shaped social space has been the use of the *châine opératoire* to analyse the lithic artefacts from the study sites, Ayn Qasiyya and AWS 48. This approach does not only incorporate a heuristic methodology, but also enables the study of technological practices and provides a link with agency (Bleed 2001; Boëda 1988, 1990 ; Conneller 2006; Cresswell 1983, 1993; Dietler & Herbich 1998; Dobres 2000; Edmonds 1990; Flenniken 1985; Gamble 1999; Ingold 2000; Lemonnier 1986, 1989, 1990, 1992; Leroi-Gourhan 1943, 1945; Pelegrin 1990, 1993 1995; Pfaffenberger 1992; Pigeot 1990; Pigeot 1991; Schlanger 1990a, b, 1994; Shott 2003). Lithic artefacts make up the single most abundant available dataset for the Epipalaeolithic and are therefore critical in shaping our understanding of these hunter-gatherer groups. Through them it becomes possible to link human action at particular places to wider concepts of dwelling, action and the social shaping of space, by situating them in their landscape context.

This thesis has focussed on the archaeology of two sites in the Azraq Oasis of eastern Jordan, Ayn Qasiyya and AWS 48. Their location provides an important angle from which to examine the core-periphery dichotomy, since they are situated in what is widely considered the arid zone. The Azraq Basin also provides unique evidence for Epipalaeolithic settlements, which have helped to contextualise and situate the fieldwork in the oasis against a wider landscape context. The survey and excavations at the site has contributed major new evidence to our understanding of the Early and Middle Epipalaeolithic occupation of the Azraq Oasis. The excavations at Ayn Qasiyya have produced evidence for two of the major Early Epipalaeolithic chipped stone industries of the southern Levant – the Kebaran and Nebekian – and is at present the only site where occupations relating to both these complexes have been documented in very close proximity. This provides a new opportunity to examine the relationship between these two lithic industries. Radiocarbon dates obtained from deposits associated with the Kebaran have produced quite an early date for this industry, falling into the 21,000-20,000 cal. B.P. range. The excavations have also revealed the largely articulated remains of an adult individual, which represents only the eighth complete set of human remains found from the Late Upper Palaeolithic – Early Epipalaeolithic time frame in the southern Levant. The unusual position this burial was found in suggests that the body may have been tied and placed into the soft marsh soil of the oasis. This provides new and additional data to our understanding of Early Epipalaeolithic burial practices. In addition, the site produced palaeoenvironmental data that showed the beginning of pedogenesis in the oasis at around 21,000-20,000 cal. B.P. during the latter part of the Last Glacial Maximum, suggesting that the oasis was a wet, amenable locality at the time of human occupation. Fieldwork at AWS 48 revealed evidence for a change in how the oasis was inhabited by people during the Middle Epipalaeolithic. Settlement appears to have been somewhat more sporadic and short-lived, focussing on task-specific, specialised activities, that very likely related to the hunting of game in the oasis and its vicinity. The precise reasons as to why this change occurred are not fully understood at present.

Using the evidence from these two sites I have situated the way in which people used these spaces within a broader perspective of socio-cultural change throughout the Epipalaeolithic in the region and beyond. Using evidence from the *châine opératoire* the characteristics of the sites and the human burial from Ayn Qasiyya, I have discussed how through peoples' repetitive practices at particular localities space was shaped and created. Through these actions memorable places became a reality and some were further enhanced through the burial of the dead. Despite the lack of permanent architecture or solid archaeological features, places became imbued with meaning and were fixed both in space and time (Boyd 1995 ; Casey 1993, 2008; Hodder 2007; van Dyke 2008; Watkins 2004a; Watkins 2004b, 2005a, b). While at some localities, such as Ayn Qasiyya, the burial of the dead and other activities did not result in a lasting presence, at other places people became bound and committed to particular localities. These places, which we know of through the excavation of Jilat 6 and Kharaneh IV, became foci for social engagements. They were likely places at which people came together at certain points of the year, and at which they likely stayed for prolonged periods of time. At Kharaneh IV, human remains buried beneath occupation surfaces attest to the connection between the burial of the dead and the reuse of these spaces. This repetitive use of these places has to be thought of in terms of human memory and social commitments. It is through these instances of cultural memory that people became committed to reoccupying these places, and these reoccupations critically reshaped their relationship with the environment and landscape, and provided a new and different context in which social relations were framed and constructed. The transient and fluid pattern of before began to be blurred and replaced with a more fixed locality of engagement and social interaction.

This social interaction can also be examined, and is a further critical aspect of how communities shaped social space through their mutual engagement. As basis for discussing this social interaction I argued that different social groups can be identified in the Azraq Basin on the basis of chipped stone assemblages. While many scholars have argued that the techno-typological characteristics and assemblage variability indicate different cultural or even ethnic groups, I argued that these different characteristics can be more readily related to different learning communities. I employed the concept of *communities of practice* to link the shared repertoire of the chipped stone assemblages with particular shared histories of learning that are situated within distinct communities that are defined by their joint enterprise (Lave & Wenger 1991; Wenger 1998). A focus on these communities of practice enabled a linking of social organization and structure with material culture and how it is patterned, to enable the delineation of two different learning communities, the Kebaran and the Nebekian. These can be thought of in more common sense terms as technological or cultural 'traditions', but I have attempted to situate these traditions more directly within practice and social engagement, rather than considering them as rigorous, primordial social structures. Instead, they are fluid and flexible, to a degree, and centred on learning and practice. What I have avoided, however, is to link the two distinct cultural groups or ethnic communities. While it is possible to discuss the chipped stone artefacts as instances of learned practices and lasting technological patterns, there is no evidence available that could be used to link these traditions to distinct biological groups; and there is even less understanding of the social, ethnic identities these groups may have had. Using the communities of practice concept it is possible to talk about social organization from the perspective of learning, and to consider the shared material repertoires as outcomes of learning processes that took place within defined social groups.

The archaeological evidence for the Epipalaeolithic in the Azraq Basin reinforces the idea that we are dealing with distinct social communities here. Apart from Ayn Qasiyya, Nebekian and Kebaran chipped stone industries only occur at different sites throughout the basin. This pattern includes Jilat 6 and Kharaneh IV, which in their earlier phases are dominated by a Nebekian and a Kebaran lithic industry respectively (Garrard, Baird & Byrd 1994; Muheisen 1988a, b). This spatial separation provides a basis on which to examine potential interactions between these communities. One piece of evidence in particular that I have discussed that exhibits this interaction are shell beads. Both Kharaneh IV and Jilat 6 contain shell beads that originate in the Red Sea and the Mediterranean (Reese 1991). Nebekian lithic industries are however confined almost exclusively to the eastern Levant, while Kebaran industries dominate the Rift Valley and western Levant (Byrd 1998; Goring-Morris & Belfer-Cohen 1998; Goring-Morris et al. 2009). This spatial distribution of the lithic industries and the presence of two different types of shell beads at each of these sites indicates not only far-reaching transport, but also the exchange of these items between different groups. They therefore provide evidence for social interaction between these communities, which we unfortunately cannot describe in much more detail. What this interaction does however indicate is that the Azraq Basin was the centre of the social worlds of these communities. A place where they came together at certain times of the year, exchanged goods and interacted. While this does not necessarily imply conflict-free relations, it nevertheless shows that people engaged with each other. Through this engagement the social landscape, consisting of places social constructed, was further conceptualised and created.

The Azraq Basin thus emerges as a region in which groups from other parts of the Levant appear to have come together. Over time, this mutual engagement appears to have resulted in the mixing of technological traditions, as is exhibited by the presence of Nizzanian lithic industries in the later strata of both Jilat 6 and Kharaneh IV (Garrard, Baird & Byrd 1994; Goring-Morris 1995; Muheisen 1988a), and the increase in sea shell exchange evident in these layers. Changes to the use of the landscape ensued with Geometric Kebaran groups continuing to occupy Kharaneh IV, while in the Azraq Oasis the settlement pattern shifted from one focussing on the springs toward a more spread-out use of the landscape. The longevity of this social interaction is evidenced not only by the number and density of archaeological sites in the region in general, but also by the size and intensity of occupation of Jilat 6 upper phase and Kharaneh IV. The repetitive and continuous use of these places heralds a marked change in how people related to their environment and landscape, and how social space was constructed in this process. People became more and more invested in these places and in the interactions that took place in the Azraq Basin. It is these social and cultural changes in the relation to space that fostered a more direct commitment to places and altered the way in which people drew on the landscape as an economic resource. It is these tentative commitment and entanglements that appear to have fostered the increasingly physical alteration of space, by constructing more permanent architecture and building larger villages, through which social strategies could be realised, were channelled and conceptualised. It is within these social changes, I argue, that the origins of architecture, sedentism and ultimately the emergence of agriculture have to be sought.

The implications of this study are limited by the nature of the available archaeological evidence. Although the Azraq Basin is one of the most intensively researched regions in the southern Levant when it comes to the Epipalaeolithic and Neolithic periods, the coverage of surface surveys has been limited. Only select wadis and the central Azraq Oasis have been comprehensively surveyed so that our understanding of the distribution of prehistoric sites is contingent on the available data. It is possible that sites of a size and intensity comparable to Kharaneh IV and Jilat 6 upper phase can be found elsewhere in the Azraq Basin. This necessarily poses problems for the discussion of landscapes presented in this thesis. There may be sites present which combine elements of both the Nebekian and Kebaran industry that could easily shatter the interpretation offered here. However, while many of the surveys in the region have been far from all encompassing, work in the region has been reasonably intense and has certainly been on the increase in recent years. Despite the lack of close-contour, detailed surveys for further sites, we are today in a good position to develop a reasonable understanding of the use of the Azraq Basin by Epipalaeolithic groups. It is questionable whether further surveys would substantially alter the understanding put forward here. In any case, the social framework used here to interpret the archaeological evidence remains applicable and leads us to continue to rethink how we understand the Early and Middle Epipalaeolithic and the changes that occurred. However, future more intensive survey work in the region would be a useful complement to our current datasets, and would critically expand our understanding of prehistoric site distributions.

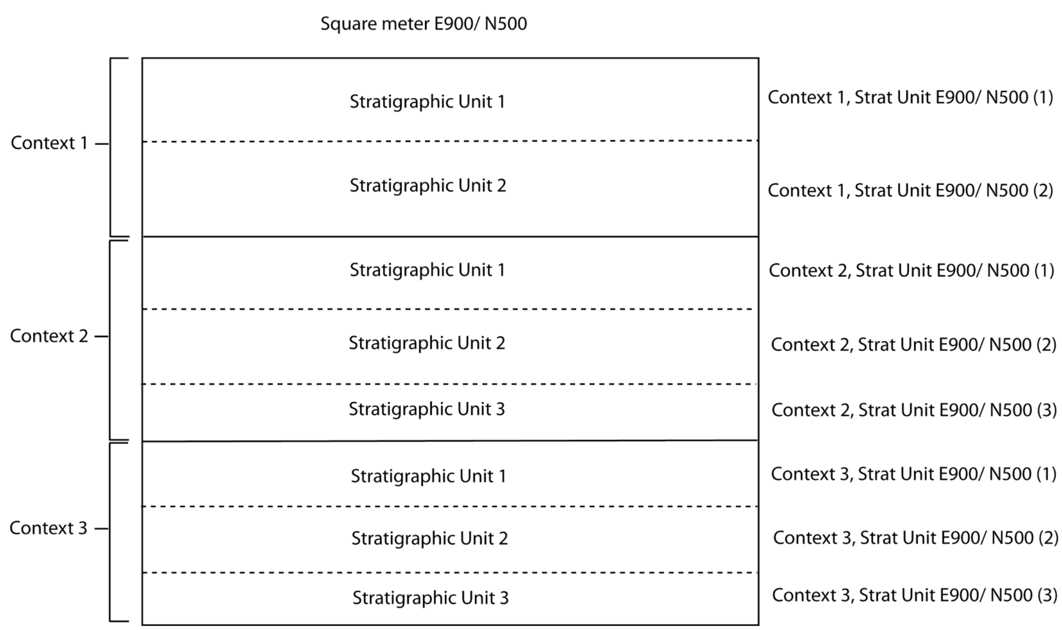
The fieldwork carried out at Ayn Qasiyya and AWS 48 has also been limited with respect to the size of areas excavated and surveyed. More work could always be done. The nature of the excavations at Ayn Qasiyya has not permitted to link up the excavation trenches' stratigraphy so far, and neither has it achieved a large open area exposure. Given the nature of the archaeological deposits, however, it seems clear that little of additional value could be learnt from large scale open area exposures alone, since distinct archaeological features do not seem to be preserved at the site. More radiometric dating is clearly required to enhance our understanding of the chronological relationship between the Early Epipalaeolithic excavation areas, and to obtain a more precise date for the human remains in Area B. Further excavations at AWS 48 would be useful to verify further the extent of the lithic scatters beneath the silt dunes, and whether archaeological deposits are better preserved here. More work on the lithic assemblages from all areas are perhaps also warranted to enhance the overall sample resolution. In addition, comprehensive studies of the faunal remains, especially the avian fauna, are a critical future step to discuss both issues of site use, function, and seasonality, and to obtain further palaeoenvironmental indicators. These are issues to be tackled in the future.

In the Azraq Basin as a whole, critical new work has already begun at Kharaneh IV, continuing the work of Mujaheed Muheisen who sadly never had the chance to fully publish his excavation results. We stand to learn much more about the social, cultural and economic transformations of the Early and Middle Epipalaeolithic by an examination of this site, its stratigraphy, features and finds. In addition, future work must also attempt to obtain further palaeoenvironmental data to better understand the regional environmental conditions in the Azraq Basin throughout the final Pleistocene and early Holocene. Lastly, although some Late Epipalaeolithic sites are known throughout the region, further work on the final stage of the Epipalaeolithic in the basin is necessary, to be able to better discuss the regional continuity.

Archaeological evidence and changes in our epistemological outlook should lead us away from considering the Early and Middle Epipalaeolithic as consisting of 'simple' hunting and gathering communities. Pressing the archaeological evidence into pre-defined moulds of a social evolutionary derived typology obscures and obstructs what can be learnt about the emergence of agriculture. An agency oriented framework suitably situates the variable practices against the backdrop of social structures and wider constraints and parameters, without imposing a pre-conceived causality onto the archaeological data. This leads us to consider the earlier Epipalaeolithic in its own right, rather than solely with a view of how it contributed to the emergence of the Neolithic.

Appendix I: Excavation recording system

The excavation recording system used during fieldwork at Ayn Qasiyya and AWS 48 represents the combination of two commonly applied systems: the single-context recording scheme predominantly used in British archaeology – and now especially standardized in contract archaeology – and the square-meter grid and spit system commonly used in Palaeolithic archaeology. While the latter enables a detailed recording of minute depositional traces and especially finds distributions, the former treats human interventions into natural deposits as discreet events and highlights the distinctiveness of each stratigraphic occurrence, which permits the grouping of finds according to distinctively defined archaeological 'events'. The single-context recording scheme in this particular instance has to be considered limited, since it was created with a view to record sites containing clearly identifiable and clearly distinguishable archaeological features, their fills, as well as occupation layers (originally within urban archaeology). The issue with many Palaeolithic sites is that distinct features are rare or difficult to define during excavation, and that the kind of processes inherent in the idea of a 'context' (e.g. layer or fill) are often too macro-scale to cater for the recording of finds distributions. The latter are particularly important in Palaeolithic sites when dealing with instances of flint knapping for example, or to evaluate site formation processes (see chapter 4). The square-meter grid and spit system, on the other hand, carries the inherent risk of excavating arbitrarily defined spits into separate layers, features or contexts, thus creating mixed assemblages of finds. Adopting a joint approach that incorporates the best of both systems the present strategy aimed to preserve both the stratigraphic integrity of each archaeological context, as well as sub-divide these contexts further to enable a recording of finds distributions and densities both horizontally and vertically.



Schematic outline of the Ayn Qasiyya/ AWS 48 excavation recording system:
Showing a schematic section, the sub-division of contexts and stratigraphic units results in the unique

The system is schematically outlined in the figure above. The site was sub-divided by a 1x1 square meter grid, each of which was labeled after the co-ordinate of the southeastern corner (the benchmark being E1000/ N1000). While contexts were recorded on a macro-level within each trench (using separate sets of numbers for each excavation area), excavations proceeded in square meters and arbitrary spits *within* these contexts. While several spits of an arbitrarily defined thickness could be excavated in each square meter the natural edges of archaeological contexts were *always respected*. To highlight this the numbering of Stratigraphic Units was specific to each excavated context (but not the square meter) proceeding in the manner outlined above.

Two types of forms were the basis of the recording scheme and are shown below. The context sheet used here is based on forms commonly used elsewhere (Westman 1994). It was adapted to present use by omitting a number of obsolete recording categories, while adding a table on which the Stratigraphic Units for this context can be recorded.

The second form used is the Stratigraphic Unit sheet. This sheet included a graph paper box representing the square meter and unit under excavation to make detailed sketches and record pre- and post-excavation levels. Description on these forms was meant to be brief, since major observations were recorded on the context sheets. Since special finds and samples were referenced directly to stratigraphic units (as well as contexts), the sheet made provisions for recording the environmental samples and special finds recovered from this unit.

Date		Initials		Context No.	
Excavation Area		Context Type			
Grid Square (s)					

Context Description

Deposit: *1. compaction, 2. colour, 3. composition, particle size, 4. inclusions, 5. thickness & extent, 6. comments, 7. method & conditions*

Cut: *1. shape in plan, 2. corners, 3. dimensions/ depth, 4. break of slope top, 5. sides, 6. break of slopes base, 7. base, 8. orientation, 9. inclination of axis, 10. truncated (if known), 11. fill #'s, 12. other comments*

Stratigraphic Matrix

This context is

Interpretation

Same as Context #:

Plan Numbers	
Section Numbers	
Photograph Numbers	
Finds in this context	
Special Find Num-bers	
Sample Numbers	

Stratigraphic Units in this Context

Unit/ Square																		
1																		
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
11																		
12																		
13																		
14																		
15																		
16																		
17																		
18																		
19																		
20																		

Checked By		Dat e		Entered on Data-base	

Square		**Unit**	
In Context		**Excavation Area**	
Date		**Initials**	
Plan Number		**Photograph Number**	
TBM		**Top Level**	
Backsight		**Bottom Level**	
Height of Instrument			

Top Depth____________
Bottom Depth_________

Top Depth____________
Bottom Depth_________

a

b

N

c

d

Top Depth____________
Bottom Depth_________

Top Depth____________
Bottom Depth_________

Description
Sediment description, contexts other than sedimentary context in this unit, stratigraphic relationship with other contexts, finds, samples, nature of artifact deposition, etc.

Environmental Samples			
Sample No.	¼ square meter	Co-ordinates	Volume/ Descrip-tion

Special Finds			
Finds No.	¼ square	Co-ordinates	Description

Checked By		**Date**	
Entered on Database			

Appendix II: Lithic Analysis Methods

The background to the lithic analysis methodology is outlined at length in chapter 4. This appendix provides a breakdown of the two stages of lithic analysis, the categories used to record attributes and variables of lithic artefacts and their definition. Definition of attributes follows broadly those of Tixier (1963), Brezillon (1968), and Inizan et al. (1992).

Three type-lists were used in the recording of retouched artefacts. The principle one used is defined below, and represents a modified version of Bar-Yosef (1970) and Goring-Morris (1987), in which a number of types were combined to reduce the overall number of listed tools. It is this type list that is used to describe retouched artefacts throughout the thesis. To provide extra levels of recording artefacts, the tool type of artefacts under Goring-Morris (1987) list and that of Byrd (n.d.) were used. To record the distribution and character of retouch on secondarily modified artefacts an adapted version of the Wembach module (Baird et al. 1995) was used.

Stage 1: Initial Artefact Sorting

Class	Definition
Cores	A nucleus; piece of flaked stone with no positive scars/ ventral surface and one or more negative removal scars; will usually have one or more platforms
Core Trimming Elements	A piece of debitage that was removed for the purpose of core repair or as part of the core preparation strategy; includes crested blades and core tablets; also includes pieces removed to repair on core faces (steps & hinges) or to correct angles (plunging pieces)
Chunks	Pieces of stone that display no ventral surface and butt, and which cannot be easily ascribed to any other category
Chips	Pieces of debitage <10mm in maximum dimension
Primary Elements	Complete pieces of debitage on which the dorsal surface is completely or almost completely (>90%) covered in cortex (incomplete pieces that had full cortex cover were classed as incomplete flakes)
Flakelets	Complete pieces of debitage <20mm and >10mm in maximum dimension
Flakes	Complete pieces of debitage >20mm in maximum dimension, which are not blades or bladelets
Incomplete Flakes*	Broken pieces of debitage >10mm in maximum dimension, which could not be clearly identified as either incomplete blades or incomplete bladelets
Blades	Complete pieces of debitage that are twice as long as they are wide, with more or less parallel sides, and displaying signs of previous blade removals indicative of a distinct blade-based core strategy
Incomplete Blades*	As in 'blades' but broken, yet clearly identifiable as originally being blades
Bladelets	Defined as in 'blades', but <12mm in maximum width
Incomplete Bladelets*	Defined as in 'incomplete blades', but <12mm in maximum width
Retouched/ secondarily modified	Any piece showing signs of retouch, edge-wear likely resulting from use, or pieces with burin scars
Burin Spalls	Pieces of debitage resulting from burins
Varia	Any piece not easily accommodated in any of the above definitions (including e.g. hammerstones)

**Complete and incomplete flakes, blades and bladelets were collapsed into their respective flake, blade and bladelet categories in the main analysis in chapter 6-9.*

Stage 2: Technological and typological Analysis

Attribute	Variable
Core Type	*Core Types:* Bladelet: single Bladelet: double opposed Bladelet: double Bladelet multiple Bladelet: pyramidical Bladelet: pyramidical opposed Bladelet: prismatic Blade: single Blade: double opposed Blade: double Blade: multiple Blade: pyramidical Blade: pyramidical opposed Blade: prismatic Bladelet: 90 degree opposed Blade: 90 degree opposed Flake: discoidal Flake: single platform Flake: multiplatform Flake: other Fragment: blade Fragment: unidentifiable Fragment: other Fragment: flake Fragment indeterminable
Length	Maximum Length of core measured at 90° angle from the main/ principle platform
Width	Maximum width of the core; measurement orientated on widest extend of platform
Thickness	Maximum thickness of core; measurement orientated at right angle to width measurement
Raw Material	Identification of raw material type (using table 8.3)
Core exterior	Absent Battered cobble cortex Rounded nodule Angular nodule Tabular piece or block
Core on flake	Yes/ no
Platform rejuvenation	Yes/ no
Platform angle 1	>75 degress 75-50 degrees 50-25 degrees <25 degrees
Platform angle 2	>75 degress 75-50 degrees 50-25 degrees <25 degrees
Notes	Descriptions, further comments and observations

DEBITAGE ANALYSIS

Debitage Type	Blade Bladelet Flake Flakelet Ridge/ crested blade Core Core face rejuvenation Core tablet Burin spall Plunger Partial ridge blade
Condition	Fresh Burnt Rolled/abraded Patinated Patinated & rolled/abraded Burnt & rolled/abraded Burnt & patinated Indeterminable
Raw material	Identification of raw material type (using table 8.3)
Cortex	Primary (>90% of dorsal surface covered in cortex) Secondary (90%-1% of dorsal surface covered in cortex) Tertiary (no cortex)
Length	Maximum length
Width	Maximum width
Thickness	Maximum thickness
Distal Termination	truncated feather hinge step plunge irregularly broken
Proximal Termination	platform truncated irregularly broken
Platform Type	n/a cortical flat facetted dihedral punctiform en chapeau de gendarme winged linear spur thin
Bulb of percussion	pronounded absent n/a

Lip	Yes/ no
Platform preparation	Yes/ no
Lateral edge profile	parallel convergent divergent irregular indeterminable sub-parallel
Ventral curvature	strongly convex slightly convex strongly concave slightly concave straight twisted indeterminable
Dorsal scar pattern	similar to removal direction opposite to removal direction bi-directional lateral left lateral right left & right multiple n/a indeterminable
Ventral features	percussion ripples edge feathering percussion ripples & edge feathering none indeterminable
Blade cross section	symmetric trapezoid asymmetric trapezoid symmetric triangular asymmetric triangular symmetric rhomboid asymmetric rhomboid n/a indeterminable

Retouched/ secondarily modified analysis

Retouched Artefact Type List

Scrapers
- end scraper
- double end scraper
- obival end scraper
- circular end scraper
- transverse end scraper
- side scraper
- thumbnail scraper
- nosed end scraper
- nucleiform/ core scraper

Burins
- burin dihedral
- burin dihedral angle
- burin on break/ natural surface
- burin beaked
- burin carinated
- burin flat faced
- burin on truncation
- burin transverse on lateral notch
- multiple burin on truncation
- multiple burin mixed

Retouched pieces
- retouched blade
- retouched flake
- backed blade
- backed and retouched
- blade utilised flake
- utilised blade
- glossed piece

Notches & denticulates
- notched piece
- denticulate piece

Truncations
- single truncation
- double truncation

Microliths
- lunate
- triangle
- isosceles triangle
- trapeze-rectangle
- La Mouillah point
- Harif point
- microgravette point
- retouched bladelet
- backed bladelet
- pointed & backed bladelet
- curved-pointed bladelet
- micropoint
- obliquely truncated bladelet
- obliquely truncated and backed bladelet

double truncated and backed bladelet
scalene bladelet
arch-backed bladelet
retouched/ backed fragment

Microburins
Qalkhan point
Krukowski microburin
piquant triedre

Perforators
awl
borer

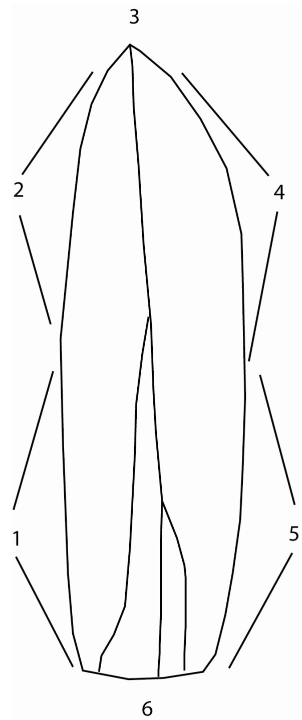
Mixed & multiple
burin-endscraper
endscraper with notch
other mixed tool

Varia

RETOUCHED ARTEFACTS RECORDING SCHEME

Type I	See type list
Type II	After Goring-Morris (1987)
Type III	After Byrd (n.d.)
Debitage Type	Blade Bladelet Flake Flakelet Ridge/ crested blade Core Core face rejuvenation Core tablet Burin spall Plunger Partial ridge blade
Condition	Fresh Burnt Rolled/abraded Patinated Patinated & rolled/abraded Burnt & rolled/abraded Burnt & patinated Indeterminable
Raw material	Identification of raw material type (using table 8.3)
Cortex	Primary (>90% of dorsal surface covered in cortex) Secondary (90%-1% of dorsal surface covered in cortex) Tertiary (no cortex)
Length	Maximum length
Width	Maximum width
Thickness	Maximum thickness
Distal Termination	truncated feather hinge step plunge irregularly broken
Proximal Termination	platform truncated irregularly broken
Platform Type	n/a cortical flat facetted dihedral punctiform en chapeau de gendarme winged linear spur thin

Bulb of percussion	pronounded absent n/a
Lip	Yes/ no
Platform preparation	Yes/ no
Lateral edge profile	parallel convergent divergent irregular indeterminable sub-parallel
Ventral curvature	strongly convex slightly convex strongly concave slightly concave straight twisted indeterminable
Dorsal scar pattern	similar to removal direction opposite to removal direction bi-directional lateral left lateral right left & right multiple n/a indeterminable
Ventral features	percussion ripples edge feathering percussion ripples & edge feathering none indeterminable
Blade cross section	symmetric trapezoid asymmetric trapezoid symmetric triangular asymmetric triangular symmetric rhomboid asymmetric rhomboid n/a indeterminable

Retouch areas		
	Six retouch areas covering each side of the artefact are defined as seen in the image above.	
Extent*	1-10% 11-50% 51-99% 100% *(Percentage of area containing retouch)*	
Retouch type*	Steep Abrupt exterior Abrupt interior Semisteep exterior Semisteep interior Bifacial Bipolar Flat invasive exterior Flat invasive interior Denticulate large Denticulate small Fine exterior Fine interior Notch Alternate Utilized exterior Utilized interior Ouchtata Multiple notches Multiple types Burin Indeterminable	

Shape if backed*	Straight and parallel to opposite edge Straight and not parallel to opposite edge Concave Convex Arched to point Shouldered Irregular Pointed Arched to 2 points Triangular Nosed Rounded Indeterminable
Distal/ proximal shape	Oblique-flat Oblique-concave Oblique-convex Krukowski microburin Break Other Negative Krukowski microburin Oblique-acute Irregular Pointed Rounded Nosed Shouldered Tongue Indeterminable
Microburin	None Scar exterior Scar partially retouched exterior Scar interior Scar partially retouched interior
Notes	Any additional observations and/ or comments
**extent, retouch type and shape of backed edge were recorded for each retouch area individually. Distal/ proximal shape and microburin were only recorded for areas 3 & 6.*	

Appendix III: Context descriptions

Ayn Qasiyya Area A

Context No.	Section No. reference	Description
18	6, 7, & 8	Topsoil: light grayish-creamy white heavily carbonate concreted deposit with a matrix of fine silt of Aeolian origin. Includes chipped stone, ceramics (Byzantine, Islamic and Medieval), as well as modern material culture (plastic & copper wire). Boundary to deposits below is sharp
22	6, 7, & 8	Very dark brown clayey silt with frequent inclusions of chipped stone and animal bone. Occasional charcoal. Deposit is unsorted and appears 'jumbled up'. Very rich organic content. Former marsh deposit heavily transformed by bioturbation. Boundary to underlying deposits is clear, but fleeting at times
60	7	Dark brown fine silt, with frequent inclusions of chipped stone and animal bone. Occasional charcoal inclusions. Boundary to underlying deposit is fleeting. Charcoal sample #24 from this context produced a date of 21,003-20,399 cal B.P. (95.4%)
80	7	Medium brownish yellow compact silty sand, with moderately frequent charcoal inclusions. Lithics and faunal remains occur sporadically and perceptively less than in the deposit above. Charcoal sample #33 produced a date of 21,078-20,443 cal. B.P. (95.4%) from this context. Boundary to overlying context is clear.
81	7	Loose and crumbly dark brown silt with moderately frequent inclusions of charcoal. Rare inclusions of chipped stone, moderate frequency of animal bones. Boundary to underlying deposit is sharp
82	6, 7, & 8	Very firm greenish grey clay, sterile: lake sediment
83	7	Dark brown highly organic clayey silt, with inclusions of chipped stone and bone, boundary to underlying deposit is moderately clear
84	7	See 80
53	6 & 8	light grayish-creamy white heavily carbonate concreted deposit with a matrix of fine silt of Aeolian origin. Boundary to underlying deposit is sharp.

AYN QASIYYA AREA B

Context No.	Section No. reference	Description
1000	9 & 11	Topsoil (see above: Area A context 18)
1003	11	Compact creamy white carbonate concreted horizon, sterile
1004	9 & 11	Very dark brown clayey silt with frequent inclusions of chipped stone and animal bone. Occasional charcoal. Deposit is un-sorted and appears 'jumbled up'. Very rich organic content. Former marsh deposit heavily transformed by bioturbation. Boundary to underlying deposits is clear, but fleeting at times. Contained human remains associated with early Epipalaeo-lithic occupation.
1005	9	Compact mid brown yellow silty sand, containing moderately frequent inclusions of charcoal, and frequent chipped stone and bone. Boundary to underlying deposit is clear.
1006	9	Very firm greenish grey clay, sterile: lake sediment
1008	9	Thin, compact very dark brown clayey silt with few inclusions of chipped stone and animal bone. Clear boundary to underly-ing deposits
1009	9	'lense' of dark brown clayey silt with a high frequency of char-coal inclusions. Boundary to underlying deposits is fleeting/ unclear
1010	9	Fairly loose/ soft dark brown silt with moderately frequent inclusions of charcoal. Rare inclusions of chipped stone, mod-erate frequency of animal bones. Boundary to underlying de-posit is sharp
1011	11	Moderately compact olive-yellow grey-brown silt deposit with numerous carbonate concretions, which contains chipped stone and faunal remains. Boundary to underlying deposit is sharp.
1012	11	Cut of a shallow ditch. This ditch was cut into Epipalaeolithic deposits in recent times (post-medieval pottery was recovered from the fill 1013). Possibly related to drainage?
1013	11	Fill of cut 1012. Light grayish-white Aeolian silt with numerous carbonate concretions, included pottery and chipped stone

AYN QASIYYA AREA D

Context No.	Section No. reference	Description
3000	3001 & 3002	Very compacted chalky white carbonate concretions with a matrix of Aeolian fine silts. Occasional inclusions of chipped stone, as well as very rare faunal remains. Boundary to underlying deposit is diffuse.
3001	3001 & 3002	A compact deposit consisting of very large, chunky carbonate concreted nodules, with a matrix of loose silts. Chipped stone and fauna are moderately frequent, often occurring conglomerated into the carbonate concretions. The boundary to the underlying context is moderately clear.
3003	3001 & 3002	Dark brown highly organic clayey silt. In the upper portion often containing small carbonate concretions. High density and frequent occurrence of chipped stone, with moderate to rare occurrence of faunal remains. The boundary to the underlying deposit is diffuse.
3004	3001 & 3002	Firm mid brownish grey silty clay with medium frequent small carbonate concretions, and high densities of chipped stone artefacts. Faunal remains rare. Boundary to underlying deposit is clear.
3005	3001 & 3002	Compact creamy-white silt with numerous carbonate concretions. Chipped stone and fauna rare/ practically sterile. Boundary to underlying contexts is sharp.
3006	3001 & 3002	Compact dark greenish grey clay: lake sediment

AWS 48.III

Context No.	Section No. reference	Description
100	AWS48.III west section	Very loose medium whiteish grey/ brown fine sandy silt with few inclusions, apart from numerous chipped stone artefacts. Ca. 5-15cm in thickness. Represents the modern landsurface/ topsoil. Of Aeolian origin. Boundary to underlying deposit is clear.
101	AWS48.III west section	Firm grayish brown coarse sandy clay with carbonate concretions, containing occasional pieces of chipped stone. Ca. 5-10cm in depth. Boundary to underlying deposit is diffuse.
102	AWS48.III west section	As 101, but much firmer. Not fully excavated.

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